Appendix D, Part 1

Harris Environmental Group, Inc.
Final Biological Assessment
TEP Proposed Sahuarita-Nogales Transmission Line Project
Western Corridor (HEG 2004a)

FINAL BIOLOGICAL ASSESSMENT

OF THE

TUCSON ELECTRIC POWER

SAHUARITA – NOGALES TRANSMISSION LINE

WESTERN CORRIDOR

20 NOVEMBER 2003

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EXECUTIVE SUMMARY

Tucson Electric Power (TEP) and Citizens Communications (Citizens) are proposing to build a new, dual-circuit, 345,000-volt (345-kV) transmission line from the TEP South Substation in the vicinity of Sahuarita, Arizona to interconnect with Citizens system at a Gateway Substation that TEP will construct west of Nogales, Arizona. From the Gateway Substation, the proposed transmission line will continue south across the United States – Mexico border for approximately 60 miles (mi) (98 kilometers [km]) into the Sonoran region of Mexico, connecting with the Comisión Federal de Electricidad (CFE, the national electric utility of Mexico) at the Santa Ana Substation. The proposed transmission line will improve Citizens' service in Nogales and allow for the transfer of blocks of electrical energy between the United States and Mexico. Southern Arizona and Sonora, Mexico have experienced rapid growth, and forecasts predict this growth will continue. Citizens' customers have already experienced outages due to limited transmission facilities into the region. TEP recognizes the need to improve transmission into the southern Arizona region and proposes to assist Citizens in meeting an Arizona Corporation Commission (ACC) mandate to improve the reliability and service of its Nogales electrical system. The ACC has ordered Citizens to improve its system by the end of 2003. The TEP Sahuarita – Nogales Transmission Line, a double-circuit 345-kV transmission line will provide the additional reliability that Citizens requires while providing additional capacity into the southern Arizona region for future needs.

This Biological Assessment (BA) was prepared to meet the requirements of Section 7 of the Endangered Species Act (ESA) of 1973, 16 U.S.C. Section 1536(a)(2). Section 7 requires all federal agencies to consult with the United States Fish and Wildlife Service (USFWS) if an action may affect listed species or their designated critical habitat. Section 7 consultation is required for any project that requires a federal permit or receives federal funding. Action is defined broadly to include funding, permitting and other regulatory actions. All activities associated with construction of the TEP Sahuarita - Nogales Transmission Line are included in the proposed action being evaluated for this BA. Because TEP has applied for a Presidential Permit to construct the transmission line across the international border, the Department of Energy (DOE) is preparing an Environmental Impact Statement (DEIS) (Tetra Tech 2003) concurrently with this document.

Federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. This is accomplished through consultation with the USFWS. If such species may be present, the applicant must conduct a BA to determine if a proposed action is likely to adversely affect listed species, or designated critical habitat. The USFWS will review this BA and issue a biological opinion (BO). DOE is the permitting agency for this proposed action, and therefore the lead federal agency on Section 7 consultation with USFWS.

The proposed action crosses a variety of land jurisdictions: including private, Arizona State Land Department (ASLD), Bureau of Land Management (BLM), and United States Department of Agriculture Forest Service (USFS). Because each jurisdiction has different requirements for environmental review of the proposed action, this document is subdivided by agency. SECTION 2 addresses species that receive protection under the ESA. SECTION 3 reviews the potential effects of the proposed action on those species classified as "Sensitive" by the USFS. SECTION 4 reviews the potential effects of the proposed action on those species classified as "Sensitive" by the BLM. SECTION 5 addresses those species that are considered "Wildlife of Special Concern" by the Arizona Game and Fish Department (AGFD). Because habitats often overlap different jurisdictions, many species have classifications within each agency. In these instances, the species is evaluated under the jurisdiction which affords the highest level of protection.

We contacted federal (USFWS) and state (AGFD) natural resource agencies to request information on possible special status species (sensitive, threatened, and endangered) that may exist on or near the proposed Western Corridor of the TEP Sahuarita – Nogales Transmission Line. Agency correspondence is presented in Appendix A.

SUMMARY OF DETERMINATIONS FOR FEDERALLY LISTED SPECIES

Based on contact with USFWS, USFS, BLM, and AGFD, 10 federally listed species may be affected by the proposed action. Upon review of the current status of these species, the environmental baseline of the project area, the effects of the proposed actions on the species as well as cumulative effects, the following determinations are made for the 10 affected species (Table 1).

Table 1. Effects of the proposed action on federally-listed species.

Species	**Potential Effect**
Mexican spotted owl	The proposed action may affect, but is not likely to adversely affect this species. The proposed action may affect, but is not likely to adversely affect proposed critical habitat for this species.
Cactus ferruginous pygmy-owl	The proposed action may affect, and is likely to adversely affect this species.
Southwestern willow flycatcher	The proposed action may affect, but is not likely to adversely affect this species.
Lesser long-nosed bat	The proposed action may affect, and is likely to adversely affect this species.
Chiricahua leopard frog	The proposed action may affect, and is likely to adversely affect this species.
Pima pineapple cactus	The proposed action may affect, and is likely to adversely affect this species.

Table 1. (continued) Effects of proposed action on federally listed species.

Species	**Potential Effect**
Sonora chub	The proposed action may affect, and is likely to adversely affect this species. The proposed action may affect, but is not likely to adversely modify critical habitat for this species.
Jaguar	The proposed action may affect, but is not likely to adversely affect this species.
Gila topminnow	The proposed action may affect, but is not likely to adversely affect this species.
Mexican gray wolf	The proposed action may affect, but is not likely to adversely affect this species.

1.0 PROJECT DESCRIPTION

1.1 Proposed Action

The proposed TEP Western Corridor Sahuarita – Nogales Transmission Line will consist of twelve transmission line wires, or conductors, and two neutral ground wires that will provide lightning protection and fiber optic communication, on a single set of support structures. The transmission line will originate at TEP's existing South Substation, in the vicinity of Sahuarita, Arizona, and interconnect with Citizens system at a Gateway Substation that TEP will construct west of Nogales, Arizona. The double-circuit transmission line will continue from the Gateway Substation south to cross the United States – Mexico border and extend approximately 60 mi (98 km) into the Sonoran region of Mexico, connecting with the Comisión Federal de Electricidad (CFE, the national electric utility of Mexico) at the Santa Ana Substation. Figure 1 shows the overall proposed project location.

The South Substation in Sahuarita will be upgraded and expanded to provide interconnection between a new TEP 345-kV transmission line and the new Gateway Substation west of Nogales. The South Substation will be expanded by approximately 1.3 acres (0.53 ha) to add a switching device that will connect to the proposed transmission line, with a 100 ft (30 m) expansion of the existing fence line for the addition of the second 345-kV circuit. The new Gateway Substation will include a 345-kV to 115-kV power transformer to provide power to the local area. The new Gateway Substation will be constructed within a developed industrial park north of Mariposa Road (State Route 189), approximately 0.5 mi (0.8 km) east of the Coronado National Forest (CNF) boundary (Northeast ¼ of Section 12, Township 24 South, Range 13 East). The TEP portion of the site is approximately 18 acres (7.3 ha) and is within the City of Nogales, Arizona. TEP has purchased the substation site and preliminary construction activities have been completed. TEP is flexible in the placement of a fiber-optic regeneration site, but it will likely be located in the area of Township 18 South, Range 12 East, approximately 10 mi (16 km) southwest of Sahuarita on private land. The fiber optic regeneration site will consist of an approximate 0.5-acre (0.2-ha) fenced yard, containing a 10 ft (3 m) by 20 ft (6 m) concrete pad with an equipment house. The cleared area for the equipment house will be approximately 20 ft (6 m) by 30 ft (9 m). There will be three 3 acre (1.2 ha) construction staging areas (located near the South and Gateway Substations and the Interstate 19 [I-19]/Arivaca Road interchange) and an 80 acre (32 ha) temporary laydown yard (also near the I-19/Arivaca Road interchange) used during construction of the proposed line.

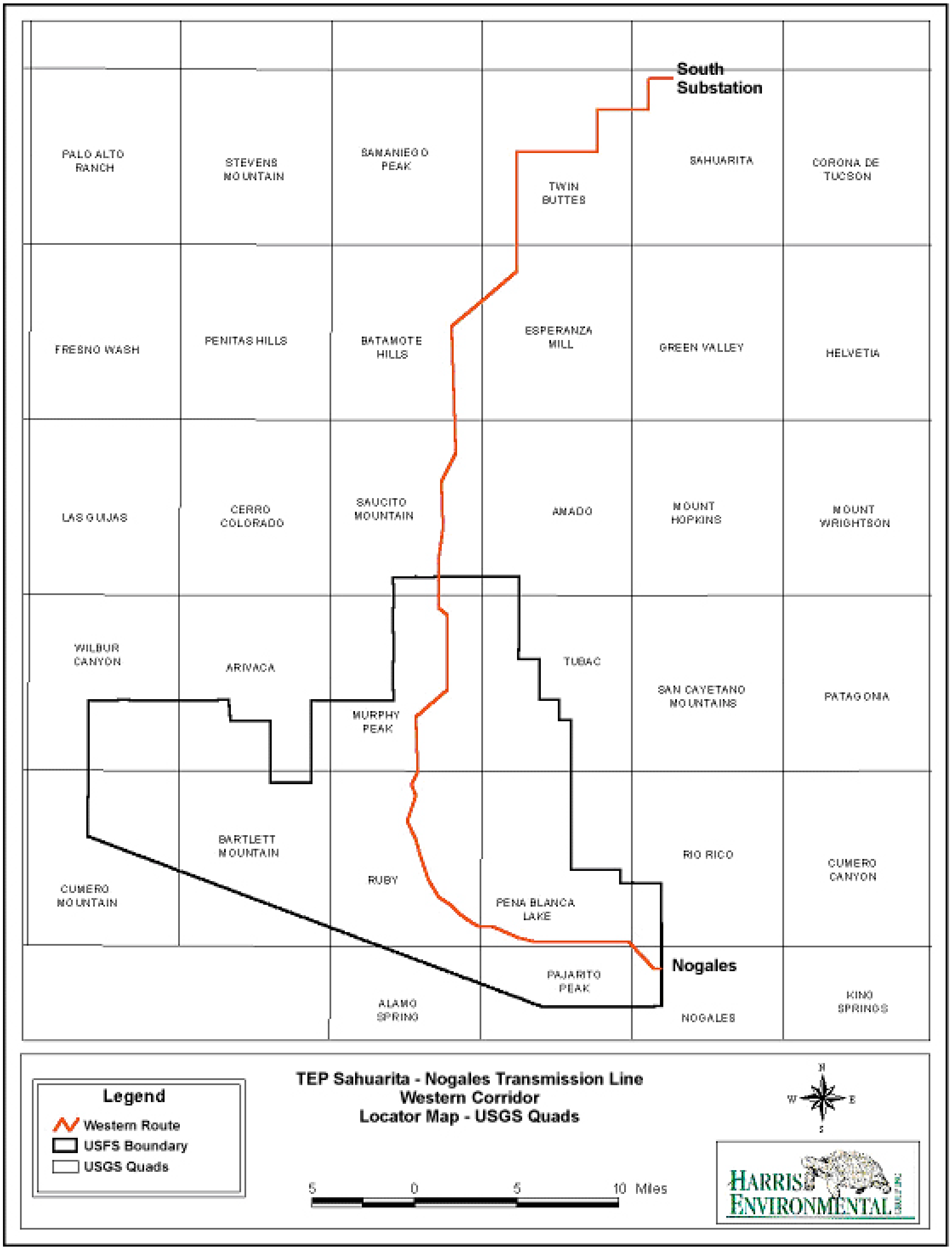

Figure 1. Map of TEP Sahuarita – Nogales Transmission Line Western

The primary support structures to be used for the transmission line are self-weathering steel single structures, or monopoles (Figure 2). Dulled, galvanized steel lattice towers (Figure 3) will be used in locations where their use will minimize overall environmental impacts, in accordance with Arizona Corporation Commission (ACC) Decision No. 64356 (ACC 2001).

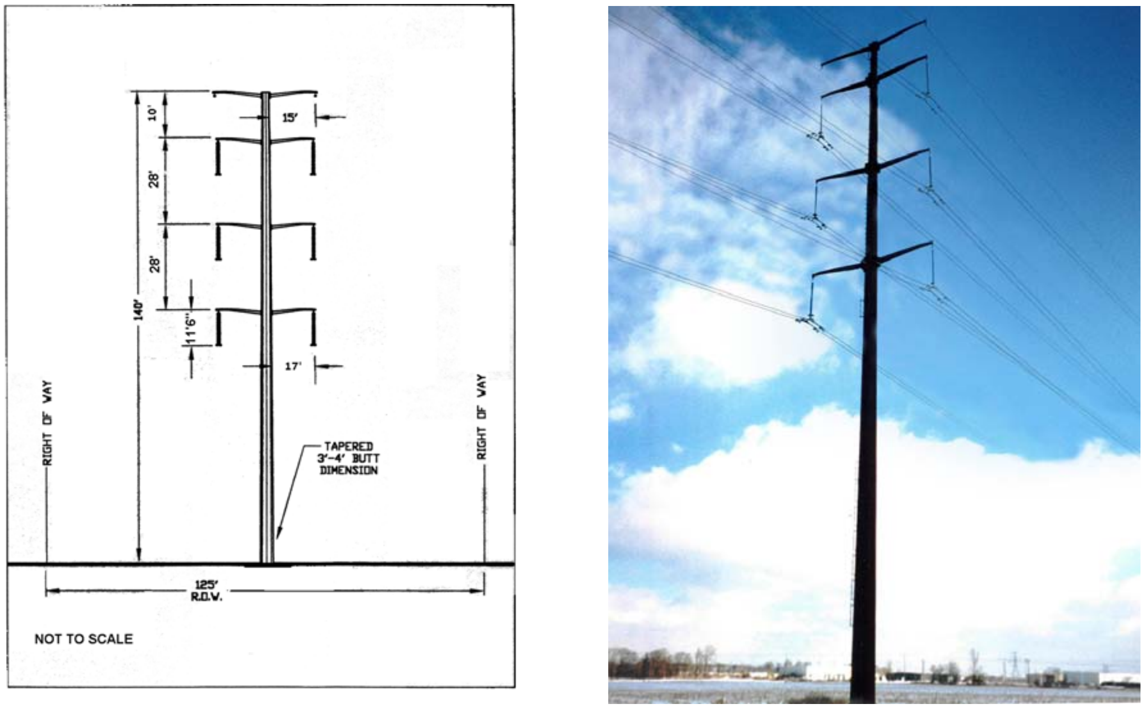

Figure 2. Monopole Transmission Line Structure Drawing and Photo.

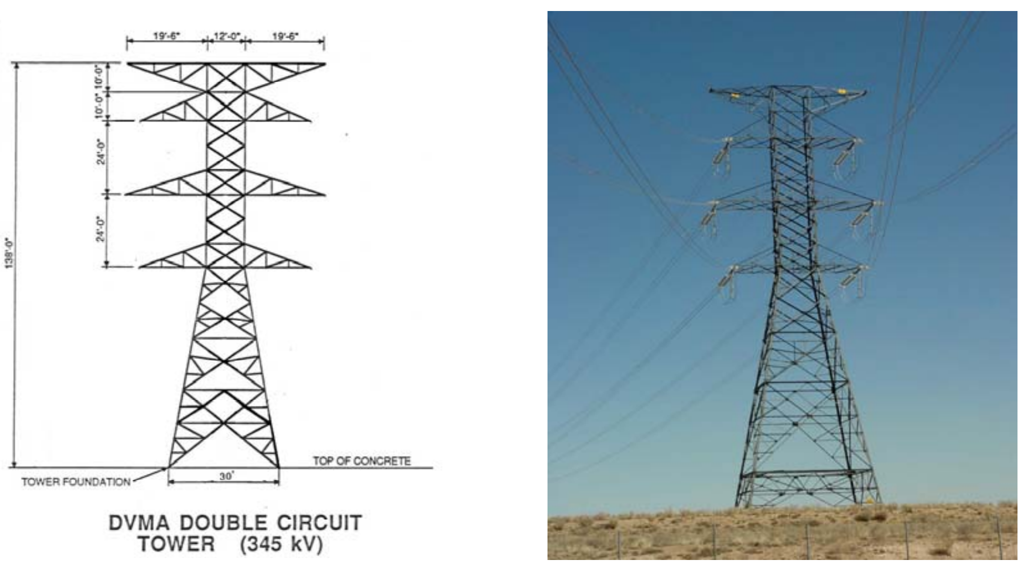

Figure 3. Lattice Tower Transmission Line Structure Drawing and Photo.

1.2 PROJECT LOCATION

The Western Corridor extends for approximately 65.7 mi (105 km), from the South Substation to the United States – Mexico border, including 9.3 mi (15 km) along the El Paso Natural Gas Company (EPNG) gasline right-of-way (ROW). The length of the Western Corridor is 29.5 mi (47.5 km) within the CNF, and approximately 1.25 mi (2.01 km) on BLM land. The Western Corridor will require approximately 446 support structures, including approximately 191 within the CNF and 9 on BLM land.

The Western Corridor exits the TEP South Substation located within the incorporated area of the Town of Sahuarita and proceeds westerly for approximately 1.0 mi (1.6 km) before turning south for 1.5 mi (2.4 km). The corridor turns west across I-19 and continues through Pima County to the southwest, crossing approximately 1.25 mi (2.01 km) of federal land managed by BLM parallel to two existing TEP transmission lines (138-kV and 345-kV). The Western Corridor turns south to parallel the EPNG gasline ROW for approximately 5.8 mi (9.3 km) and passes just east of the existing TEP Cyprus Sierrita Substation.

The Western Corridor continues past the Cyprus Sierrita Substation to the southwest, then turns south and enters Santa Cruz County after 6.3 mi (10 km). The Western Corridor enters the CNF 6.0 mi (9.7 km) south of the Santa Cruz County line. The Western Corridor passes south along the west side of the Tumacacori and Atascosa mountains, then meets and runs along the south side of Ruby Road as it turns gradually east, north of the Pajarita Wilderness. The Western Corridor continues south of Ruby Road then intersects the EPNG gasline ROW.

The Western Corridor continues through USFS land, paralleling the EPNG gasline ROW to the southeast for several miles to the CNF boundary. The proposed corridor exits USFS land onto private land and proceed 0.5 mi (0.8 km) east to the Gateway Substation. From the Gateway Substation, the proposed corridor returns to the west through private land and then turns south to parallel the CNF boundary. The proposed corridor meets the United States – Mexico border approximately 3,300 ft (1,006 m) west of Arizona State Highway 189 in Nogales, Arizona.

TEP will use existing utility maintenance roads and ranch access roads, where feasible,and new access ways where no access currently exists. Approximately 20 mi (32 km) of new temporary roads will be built for construction of the Western Corridor on the CNF (URS 2003a); spur roads off existing access roads adjacent to TEP transmission lines will provide project access on BLM land. On the CNF, transmission line tensioning and pulling and fiber-optic splicing sites will also disturb land.

The total new temporary area of disturbance on the CNF during construction of the Western Corridor will be approximately 197 acres (79.7 ha) (URS 2003a). Following construction, TEP will close roads not required for project maintenance and will limit access to maintenance roads, in accordance with agreements with land owners or managers (e.g., BLM or USFS). On USFS land, TEP will close existing road mileage equal to that required for project maintenance, to avoid impacting the current road density. The maintenance access required by TEP will be limited to roads to selected structures, rather than a single cleared ROW leading to the United States – Mexico border. Transmission line tensioning and pulling sites, fiber-optic splicing sites, and construction yard areas will be obliterated within six months of the project becoming fully operational (URS 2003a).

1.3 PROJECT AREA

The project area includes the location where all construction and associated activities will occur along the ROW. Action areas are locations affected directly or indirectly by these activities and often include sites outside the immediate area of construction. Action areas are unique for each listed species and are outlined in SECTION 2.0 of this document.

Between Sahuarita and Nogales, the proposed action crosses four distinct biotic communities, or biomes (Brown 1994). A complete list of plant species documented during field surveys in 2002 is presented in Appendix B.

Figure 4. Sonoran desertscrub.

The northern end of the corridor contains vegetation characteristic of the Sonoran desertscrub biome (Figure 4). This biome is typically represented by saguaro (*Carnegiea gigantea*), cholla and prickly pear (*Opuntia* spp.) cacti, ocotillo (*Fouquieria splendens*), mesquite (*Prosopis velutina*), acacia (*Acacia* spp.) paloverde (*Parkinsonia* spp.), (*Larrea tridentata*), triangle-leaf bursage (*Ambrosia deltoidea*), and brittlebush (*Encelia farinosa*).

Vegetation south of the ASARCO mine transitions into the semidesert grassland biome (Figure 5). This area is dominated by grama (*Bouteloua* spp.), lovegrass (*Eragrostis* spp.), and three-awn (*Aristida* spp.) grasses, with low shrubs such as mesquite and acacia locally co-dominant. Agave (*Agave* spp.) and yucca (*Yucca* spp.) are also common in this biome. These grasslands are transected by desert riparian scrub dominated by mesquite and netleaf hackberry (*Celtis reticulata*).

Figure 5. Semidesert grassland.

Figure 6. Madrean oak woodland.

The higher elevations (above 3,500 ft [1,067 m])of the project area are within the madrean oak woodland biome (Figure 6). Representative plants of this biome within the project area include Mexican blue oak (*Quercus oblongifolia*) and emory oak (*Q. emoryi*) trees, side-oats grama (*B. curtipendula*), hairy grama (*B. hirsuta*), and fluffgrass (*Erioneuron pulchellum*).

The 4th biome represented within the project area is the Sonoran deciduous riparian forest (Figure 7), which is located south of Arivaca Road in Sopori Wash, Peck Canyon, and Sycamore Canyon. The high water table in these areas supports stands of cottonwood (*Populus fremontii*), ash (*Fraxinus pennsylvanica* ssp. *velutina*), sycamore (*Platanus wrightii*), walnut (*Juglans major*), and willow (*Salix* spp.) trees.

Figure 7. Sonoran deciduous riparian forest.

The proposed ROW begins at an elevation of approximately 2,674 ft (815 m) at the TEP South Substation and reaches its maximum elevation of approximately 4,500 ft (1,372 m) south of Atascosa Peak. Much of the northern portion of the proposed ROW consists of gently rolling hills and bajadas. The most significant topographical feature crossed by the proposed ROW in Pima County is Tinaja Peak (4,321 ft [1,317 m]) located southwest of the ASARCO Mine complex. The southern portion of the proposed ROW passes near the Tumacacori and Atascosa Mountains, both of which contain steep, rugged terrain. The maximum elevation within these ranges is Atascosa Peak (6,440 ft [1,963 m]).

The Tumacacori Ecosystem Management Area (EMA) contains the following Special Management Areas: Pajarita Wilderness Area, Sycamore Canyon, Goodding Research Natural Area (RNA), Chiltepine Botanical Area, and Inventoried Roadless Areas.

The Pajarita Wilderness Area (designated in 1984) encompasses 7,448 acres (3,014 ha) southwest of the Western Corridor and north of the international border. More than 660 plant species have been documented in this area, including 17 species not found anywhere else on earth. This area is valued for its nearly pristine nature and remoteness, with little disturbance resulting from human access. To maintain this landscape, motorized access in this area is prohibited; however, livestock grazing is permitted within Pajarito Wilderness outside of the Goodding RNA.

Sycamore Canyon, which runs through the Pajarita Wilderness Area, contains unique habitats of many plants and animals that are not found in the surrounding areas or are at the periphery of their natural environment. Sycamore Creek, one of the few perennial streams in southern Arizona, runs along the floor of Sycamore Canyon. A 1,759 acre (712-ha) section of Sycamore Creek and its immediate environment was nominated in 1993 as a Wild and Scenic River under the National Wild and Scenic Rivers System Act of 1968. This nomination is in recognition of the exceptional scenic, recreational, ecological, and social values supported by Sycamore Creek.

The Goodding RNA (established in July 1970) encompasses 2,207 acres (893 ha) primarily within the Pajarita Wilderness Area and along Sycamore Canyon. This special designation was placed on the area because it is characterized by Mexican floral and faunal elements that did not otherwise occur, or were elsewhere rare, in the United States.

The Chiltepine Botanical Area is a 2,836 acre (1,148 ha) reserve located approximately 2 mi (1.2 km) west of the Western Corridor, in the northern portion of the Tumacacori EMA. This area was established in June 1999 for the purpose of protecting and facilitating the study of chiltepines. These wild chiles typically are found in tropical environments between Mexico and South America. This area has been noted as the northernmost occurrence of chiltepine in the world.

Inventoried Roadless Areas have been identified within the Tumacacori EMA, encompassing 21,363 ha (52,788 acres). These areas were established by a Record of Decision on 12 January 2001 on the Roadless Area Conservation Final DEIS.

1.4 CONSERVATION MEASURES

PROJECT-WIDE CONSERVATION MEASURES

1. Environmental Training - All construction supervisors will be required to attend environmental training, which will outline their obligation to obey applicable laws and regulations regarding wildlife and habitats (Appendix C).

2. Erosion Control Measures - TEP is in consultation with CNF regarding development of Best Management Practices (BMPs) for minimizing project impacts on geologic, soil, and water resources on national forest land, in accordance with the USFS "Soil and Water Conservation Practices Handbook" (USFS 1990). Specific BMPs will be identified after coordination with Arizona Department of Environmental Quality (ADEQ) and before implementation of the project, for the entire length of the selected corridor.

3. Fire Prevention Plan - A Fire Prevention Plan is under development to minimize the risk of accidental wildfire. All construction activities will adhere to this plan and fire suppression equipment will be available to all work crews. On CNF lands, the Fire Prevention Plan will comply with Forest Service Manual 5100.

4. Hazardous Material Spill Response Plan - A Hazardous Material Spill Response Plan is under development which will describe the measures and practices to prevent, control, cleanup, and report spills of fuels, lubricants, and other hazardous substances during construction operations. This plan will ensure that no hazardous materials are stored, dispensed, or transferred in streams, watercourses, or dry washes, and vehicles are regularly inspected and maintained to prevent leaks.

5. Invasive Species Control - An Invasive Species Management Plan in accordance with Executive Order 13112 is under development in coordination with CNF, ASLD, and BLM to identify problem areas and mitigation measures.

6. Road Closure/Obliteration - TEP has committed to obliterate and permanently close 1 mi (1.6 km) of existing road on the CNF (to be identified by CNF) for every 1 mi (1.6 km) of proposed new road used in the construction, operation, or long-term maintenance of the proposed action. TEP will monitor road closures during regularly scheduled inspection flights and/or ground inspections, and repair or replace road-closure structures as necessary following construction. Furthermore, TEP will cooperate with land owners on all reseeding and ongoing road closure maintenance.

   The following selective criteria and techniques for closing roads are taken from Section 1.3.2 of the RA (URS 2003) and applies to access roads on CNF. Administrative roads will be closed to the general public but made available to TEP and its assigned contractors for the evaluation, maintenance, or upgrading of existing facilities.

Closure methods for administrative roads will include the following:

a. Placement of heavy pipe posts with an attached, locked chain in a manner that blocks entrance on the road.

b. Placement of heavy pipe posts with an attached, locked gate in a manner that blocks entrance on the road.

c. Placement of a pipe barricade across the roadbed, locked in place in multiple locations in concrete sleeves.

The following methods may be used for the long-term closure of transmission line access roads used during construction and those roads required to be closed by the CNF. These roads may be reopened for emergency repair of transmission facilities, but will not be used intermittently as with administrative roads. Techniques include:

a. Placement of boulders or other natural impediments across the road.

b. Placement of a berm or trench across the road.

c. Rip, obliterate, and reseed/revegetate portions of roadbed as needed. This effort could be applied to the initial visual portion of roadway (e.g., first 100 ft [30 m]) to effectively obscure the roadway. This could be accomplished by transplanting native species of medium and large vegetation from the general area and reseeding with native grasses. By obscuring visible portions of roadway, future vehicular travel could be more effectively discouraged than by placing berms or other unnatural impediments to an otherwise visually inviting roadway.

7. Additional mitigation measures are outlined in Table 2.2-2 of the DEIS (Tetra Tech 2003).

SPECIES-SPECIFIC CONSERVATION MEASURES

Mexican spotted owl (MSO)

1. Breeding season restriction – no construction activity will occur between Structures #24 and #45 of Segment 4 from 1 March to 31 August.

2. Protocol surveys will be conducted in the year immediately before construction in Sycamore Canyon north of Ruby Road to determine the presence /absence of MSO in this area. If MSO are detected, USFWS will be consulted for further guidance.

3. No trees over 9 in (22.8 cm) diameter breast height (DBH) in MSO habitat will be removed.

Cactus ferruginous pygmy-owl (CFPO)

1. Protocol surveys – Two consecutive years of protocol surveys will be conducted before construction activities can be begin within 1,969 ft (600 m) of designated habitat. If a CFPO is detected, USFWS has determined that certain continued construction activities will not harm or harass a CFPO as defined by ESA regulations. In areas where two consecutive years of protocol surveys cannot be completed, construction will occur outside of the breeding season.

   Four zones are described (Zone I through Zone IV) that are based upon the distance of construction activity from a known nest or activity center. Certain levels of construction can occur within each zone without resulting in harm or harassment of the species. Situations that do not comply with the restrictions provided for each zone will require USFWS authorization before construction continues. Specific development restrictions that apply to each of the four zones are described in the sections below:

   Zone I: 0 to 328 ft (100 m) from the CFPO Activity Center

   1. No additional clearing of vegetation will be permitted without authorization from USFWS and relevant land management agencies.

   2. Construction-related activities may continue on land that has been cleared of vegetation provided that they do not exceed the level and/or intensity of activity that was occurring during the period of time that the territory was established.

   3. Activities that will be more intense or cause more noise disturbance than was occurring during the period of time that the territory was established cannot proceed without authorization from USFWS and relevant land management agencies.

   Zone II: 328 ft (100 m) to 1,312 ft (400 m) from the CFPO Activity Center

   1. No additional clearing of vegetation will be permitted without authorization from USFWS and relevant land management agencies.

   2. No restrictions on the nature or type of construction activity (excluding the clearing of vegetation) from 1 August through 31 January of the following calendar year.

   3. Construction activities during the breeding season (1 February to 31 July) cannot exceed the levels or intensity of activities that occurred at the time the territory was established.

Zone III. 1,312 ft (400 m) to 1,969 ft (600) from the CFPO Activity Center

1. No additional clearing of vegetation will be permitted without authorization from USFWS and relevant land management agencies.

2. No restrictions on the levels or intensity of construction activity (excluding the clearing of vegetation) at any time of the year.

Zone IV: Greater than 1,969 ft (600 m) from the CFPO Activity Center

1. No restrictions – any activity consistent with the project description provided to USFWS (as amended by the supplemental reports) is allowed. For the purposes of this consultation, USFWS assumes that all construction or construction-related activities referred to under each zone description will be limited to those described in the project description in this BA.

2. All saguaros within construction areas will be transplanted or mitigated with minimum 6.5 ft (2 m) specimens. Within riparian desertscrub and deciduous riparian areas, tree and shrub removal will be minimized to the greatest extent possible.

Southwestern willow flycatcher (SWFL)

1. Damaged deciduous riparian vegetation will be mitigated with structure plantings of willow or cottonwood at a 2:1 ratio by species.

Lesser long-nosed bat (LLNB)

1. Agave within construction areas will be transplanted or replaced with similar age and size class individuals.

Chiricahua leopard frog (CLF)

1. To prevent the spread of disease, equipment-cleaning stations will be established at sites to be determined in consultation with CNF and USFWS.

Pima pineapple cactus (PPC)

1. Purchase of 36.45 credits in a USFWS-approved conservation bank for PPC.

Jaguar

1. Five remote cameras will be donated to the Jaguar Conservation Team to assist with monitoring of jaguar movements across the Arizona-Mexico border. These cameras will be placed within the Tumacacori EMA under permit from CNF. If female jaguar or cubs are documented by the Jaguar Management Team within the Tumacacori EMA, consultation with USFWS will be reinitiated.

2.0 FEDERALLY LISTED SPECIES

Special status species are plant and wildlife species that are of concern because their populations are either in jeopardy of extinction or are declining in number. AGFD and USFWS were contacted concerning information on possible threatened and endangered species that may exist on or near the proposed action. In a letter dated 14 May 2002, USFWS listed 18 endangered species, seven threatened species, and two proposed species that occur in Pima and Santa Cruz counties, Arizona (Table 2). Since that time, 2 additional species have been listed (Chiricahua leopard frog [Rana chiricahuensis] and jaguar [Panthera onca]), both of which are addressed in this document. A review of the species list for Pima and Santa Cruz Counties on the USFWS Arizona Ecological Field Services web page on 10 November 2003 indicated no further changes to the species list. Agency correspondence is presented in Appendix A. Species included in USFWS correspondence, but excluded from evaluation are addressed in Appendix D.

Meetings with USFWS and USFS personnel were held on 9 April, 13 May, 3 December 2002, and 28 March 2003 to discuss the potential effects of the proposed action on special status species. BLM personnel also attended the 3 December 2002 meeting. A meeting with AGFD was held on 19 April 2002. Additional meetings were held with USFWS on 30 May, 6 November, and 10 December 2002, and 19 March, 16 May, 11 June, 14 July, and 11 September 2003.

Table 2. Federally listed species that may occur near the proposed action.		
SPECIES	STATUS	EFFECTS DETERMINATION
Canelo Hills ladies' tresses	Endangered	No Effect
Cactus ferruginous pygmy-owl	Endangered	May affect, likely to adversely affect
Desert pupfish	Endangered	No Effect
Gila topminnow	Endangered	May affect, not likely to adversely affect
Huachuca water umbel	Endangered	No Effect
Jaguar	Endangered	May affect, not likely to adversely affect
Jaguarundi	Endangered	No Effect
Kearney’s blue star	Endangered	No Effect
Lesser long-nosed bat	Endangered	May affect, likely to adversely affect
Masked bobwhite	Endangered	No Effect
Mexican gray wolf	Endangered	May affect, not likely to adversely affect
Nichols turk's head cactus	Endangered	No Effect
Northern aplomado falcon	Endangered	No Effect
Ocelot	Endangered	No Effect
Pima pineapple cactus	Endangered	May affect, likely to adversely affect
Sonoran pronghorn	Endangered	No Effect
Sonoran tiger salamander	Endangered	No Effect
Southwestern willow flycatcher	Endangered	May affect, not likely to adversely affect
Bald eagle	Threatened	No Effect
California brown pelican	Threatened	No Effect
Chiricahua leopard frog	Threatened	May affect, likely to adversely affect
Loach minnow	Threatened	No Effect
Mexican spotted owl	Threatened	May affect, not likely to adversely affect
Sonora chub	Threatened	May affect, likely to adversely affect
Spikedace	Threatened	No Effect
Mountain plover	Proposed	No Effect
Gila chub	Proposed	No Effect

2.1 MEXICAN SPOTTED OWL (*Strix occidentalis lucida*) (Threatened)

2.1a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. The action area for the MSO includes those areas of MSO habitat that may be directly impacted by construction as well as protected activity centers (PAC) within 1 mi (1.6 km) of the proposed action that may be subject to noise disturbance during construction. The entire action area for this species is within the Tumacacori EMA.

2.1b Natural History and Distribution

The MSO is one of three subspecies of spotted owl currently recognized by the American Ornithologists' Union in their most recent treatise on subspecies (A.O.U. 1957). However, Dickerman (1997), in a recent taxonomic review of *S. o. lucida*, has identified three subspecies throughout the species' range, including resurrecting the use of *S. o. huachucae* as the subspecies in the southwestern United States and northern Mexico. Although this new revision is probably valid, the currently accepted taxonomy was followed. The MSO (Figure 8) is a medium-sized owl with a round head lacking ear tufts; light brown to dark brown plumage, and dark eyes. It has white spots on the head and nape, and white mottling on the breast and abdomen; thus, the name spotted owl (Pyle 1997). All three subspecies of spotted owl inhabit mountainous, forested regions of western North America.

Figure 8. Mexican spotted owl.

A detailed account of the spotted owl, inclusive of the three currently recognized subspecies, is given by Gutiérrez et al. (1995). Ganey (1998) presents a synthesis of what is presently known about the MSO, particularly in Arizona. The MSO Recovery Plan (USFWS 1995a) and technical supporting chapters on distribution and abundance (Ward et al. 1995), population biology (White et al. 1995), landscape analysis and metapopulation structure (Keitt et al. 1995), habitat relationships (Ganey and Dick 1995), and prey ecology (Ward and Block 1995) also are important summary documents. The following brief species account was obtained from these and other more current references.

The MSO is widely but patchily distributed in forested mountains and canyons from southern Utah and central Colorado, south into Arizona, New Mexico, extreme western Texas, and into Mexico to near Mexico City (McDonald et al. 1991, Gutiérrez et al. 1995, Ward et al. 1995, Dickerman 1997). The MSO nests, roosts, forages, and disperses in a variety of habitats in Arizona from about 3,770 ft (1,236 m) to 9,600 ft (3,150 m). Nest and roost habitats include forests and woodlands that are structurally complex, unevenly aged and multistoried, with mature or old-growth stands containing trees older than 200 years with a high (>70 percent) canopy closure, including many snags and fallen logs (Ganey and Dick 1995). According to Ganey (1998), they appear to be most common in mature and old growth forests in steep canyons, but also are found in canyons that include prominent cliffs with little forested habitat. The MSO preys on small mammals, birds, reptiles, and insects, with woodrats (*Neotoma* spp.) and white-footed mice (*Peromyscus* spp.) constituting the bulk of its diet by biomass (Ward and Block 1995, Ganey et al. 1992, Reichenbacher and Duncan 1992).

Adult MSO are considered to have a relatively high survival rate, with an estimated probability of adult survival rate of 0.8 to 0.9 from one year to the next (White et al. 1995). Juveniles on the other hand, have a much lower survival probability rate, ranging from 0.06 to 0.29 (Ganey et al. 1998, White et al. 1995). There is a great deal of spatial and temporal variation in reproductive output, but one estimate places the general reproductive rate at 1.001 fledglings per pair (White et al. 1995). Typical of *K*-selected species (Ricklefs 1990), the MSO is long-lived with low reproductive output and generally maintains population densities near carrying capacity. The high survival rate of *K*-selected species enables MSO to maintain stable populations over time despite variable recruitment rates (White et al. 1995).

In 1993, the MSO was federally listed as a threatened species by the USFWS. The listing was based primarily on historical and ongoing habitat alteration due to timber management practices, specifically the use of even-aged silviculture, the threat of these practices continuing as prescribed in National Forest Plans, and the threat of additional habitat loss from catastrophic wildfire (USFWS 1993a).

The primary administrator of lands supporting MSO in the United States is the USFS. According to the recovery plan, 91 percent of MSO known to exist in the United States between 1990 and 1993 occurred on land administered by USFS (USFWS 1995a). The majority of known MSO have been found within Region 3 of the USFS, which includes 11 National Forests in New Mexico and Arizona. USFS Regions 2 and 4, including two National Forests in Colorado and three in Utah, support fewer MSO.

2.1c Critical Habitat

Critical habitat was designated for the MSO in 1995 (USFWS 1995b). However, it was revoked by court order in 1998 for failing to complete the National Environmental Policy Act process (USFWS 1998a). USFWS (USFWS 2000a) again proposed to designate 13.5 million acres (5.6 million ha), mostly on USFS land, as critical habitat for the species in 2000. The final rule published in the Federal Register on 1 February 2001 designated approximately 4.6 million acres (1.9 million ha) in Arizona, Colorado, New Mexico, and Utah on federal land outside of the USFS system (USFWS 2001a). The reason given for not designating critical habitat on USFS land was that current Forest Plans conform to management guidelines outlined in the recovery plan, which have undergone consultation with the USFWS, whereas other federal agencies have yet to formally adopt these guidelines.

On 13 January 2003, a federal judge stated that the USFWS final rule designating critical habitat for the MSO violated the ESA. On 18 November 2003, the USFWS again redesignated proposed critical habitat for the MSO, including unit BR-W-13 in the

Atascosa/Pajarito Mountains. The proposed action crosses this unit of proposed critical habitat.

2.1d Current Status Statewide

In Arizona, MSO have been documented throughout much of the state except for the arid southwestern portion. The greatest concentration of owls occurs along the Mogollon Rim from the White Mountains region to the peaks near Flagstaff and Williams (Ward et al. 1995, Ganey 1998). The majority of owls are located on federal lands managed by the USFS (USFWS 1995a).

There are three Recovery Units (RU) identified in Arizona. From north to south they are the Colorado Plateau, Upper Gila Mountains, and Basin and Range-West. No current estimate of the number of MSO within its entire range is available, but between 1990 and 1993, 103 MSO sites were recorded during planned surveys and incidental observations in the Basin and Range-West RU in Arizona (USFWS 1995a).

2.1e Environmental Baseline

The proposed action occurs in the Basin and Range - West RU. Within this RU, MSO are mainly associated with steep, rocky canyons containing cliffs and stands of oak, Mexican pine, and broad-leaved riparian vegetation (Ganey and Balda 1989). Most MSO habitat in this RU occurs on the CNF.

The proposed action passes through the Tumacacori EMA of the CNF, which currently contains five PACs. The majority of the EMA crossed by the proposed action is madrean evergreen woodland; however, much of it lacks the features typically associated with MSO habitat. Range condition in areas crossed by the proposed action is moderately high with a stable or unknown trend. Native grasses dominate groundcover throughout the action area, but some non-native species, such as Lehmann's lovegrass (*Eragrostis lehmanniana*), tree of heaven (*Ailanthus altissima*), and salt cedar (*Tamarix* spp.) occur within the EMA (USFS 2002). Lehmann's lovegrass was seeded in many areas to prevent erosion (Cox et. al. 1984) but has extended in range far beyond the seeded areas (Cox and Ruyle 1986).

Livestock stocking rates for the allotments within the Tumacacori EMA range from 1,320 Animal Unit Months (AUM) in the Peña Blanca Allotment to 2,400 AUMs in the Bear Valley Allotment. Allotment Management Plans for Bear Valley and Sardinia Allotments are currently being revised.

The proposed action passes within 1 mi (1.6 km) of PAC #0502015 and #0502016, which are immediately adjacent to each other and south of Ruby Road. PAC #0502015 contains portions of USFS roads 4195 and 4196, as well as small segments of unclassified roads. Additionally, numerous roads and campgrounds, both designated and user-created, occur within 1.6 km (1 mi) of this PAC. Multiple unclassified roads created by the U.S. Border Patrol also occur throughout the area south of Ruby Road and east of the Pajarito Wilderness Area (URS 2003).

Figure 9. Area burned in Walker fire.

The Walker Fire, a human-caused fire, burned 16,369 acres (6,624 ha) along the United States-Mexico border between 12 June and 22 June 2002. The majority of PAC #0502016 and the western portion of PAC #0502015 were within the Walker Fire perimeter. Portions of the Walker fire were very hot, especially near the international border, and the upper slopes of ridges, while areas like Walker Canyon burned relatively cool (T. Newman, CNF, pers. comm., 26 November 2002). While vegetation has begun to recover in some areas, other areas are highly susceptible to erosion due to lost groundcover (Figure 9).

The following MSO survey information was provided by CNF. PAC #0502015 has been surveyed or informally monitored twice (1999 and 2001) over the past five years, with MSO pair occupancy inferred or confirmed in 1999. No response was detected in 2001. Since 1998, PAC #0502016 was only informally monitored in 2001, with no response by MSO. Additionally, CNF personnel received reports of MSO calling in Sycamore Canyon north of Ruby Road in 2001. Following similar reports, the presence of an MSO in Rock Corral Canyon could not be confirmed after informal monitoring by CNF personnel.

2.1f Effects of Proposed Action on the MSO and Proposed Critical Habitat

Direct Effects

Vehicle and Powerline Collisions

Because MSO are primarily nocturnal and likely will not be active during daylight when construction occurs, the probability of MSO collisions with construction related vehicles is extremely low. To minimize the risk of powerline collisions, TEP will construct the proposed transmission line following the guidelines outlined in "Suggested practices for raptor protection on powerlines: the state of the art in 1996" (APLIC 1996). While there is always some risk of a MSO collision with powerlines, raptors have lower rates of collision with powerlines than passerine birds (McNeil et al. 1985). This reduced collision rate may be due to visual acuity, maneuverability, and non-flocking tendencies (Nobel 1995). The risk of bird collisions with towers has been associated with birds being attracted to red lights used for aircraft avoidance (Kerlinger 2000). The towers used in the proposed action will not contain any lighting. No guy wires will be used in the construction of the proposed action, further reducing the potential for collisions.

Electrocution

Because power structures and towers are attractive perching and nesting sites for some raptor species, significant raptor mortality from electrocution has been reported in North America (Harness and Wilson 2000). Electrocution occurs when a bird simultaneously touches two phase conductors or a conductor and a ground wire (Bevanger 1994). Most electrocutions occur on distribution lines (34-kV or less) rather than on transmission lines (69-kV or more). This occurs because clearance between wires on distribution lines are less, and distribution lines have an array of uninsulated, structure-mounted equipment (Marti 2002). To minimize the risk of raptor electrocutions, TEP will construct the proposed transmission line following the guidelines outlined in "Suggested practices for raptor protection on powerlines: the state of the art in 1996" (APLIC 1996). Furthermore, on the structures to be used in the proposed action, the distance between the powerlines is at least 18 ft (5.5 m). Because the average wingspan of an adult MSO is 3.3 ft (1 m), there is no foreseeable risk of electrocution.

Construction Noise and Activity
Human activity within breeding and nesting territories may affect some raptors by altering home range movements (Anderson et al. 1990) and causing nest abandonment (Postovit and Postovit 1987). Disturbance from construction activities may discourage MSO from foraging or nesting in suitable habitat. The greatest noise disturbance will result from the use of helicopters during installation of transmission lines; however, Delaney et al. (1999) found that MSO were disturbed more by ground-based disturbance, such as chain saws, than by helicopter overflights. Ground-based disturbance could result from heavy machinery or large groups of construction personnel working near MSO habitat.

To prevent the disturbance of breeding MSO, no construction activities will occur within 1.6 km (1 mi) of PAC #0502015 (Figure 10) and #0502016 during the breeding season (1 March to 31 August), as outlined in the conservation measures (SECTION 1.4). Construction during non-breeding season will be short term in duration. Furthermore, protocol surveys in the area of reported MSOs in Sycamore Canyon north of Ruby Road will prevent disturbance of MSOs outside of known PACs. If MSO are detected during the future surveys in this area, USFWS will be consulted for guidance regarding the implementation of construction restrictions.

Indirect Effects
Habitat Modification and Fragmentation
Because much of the ROW lacks the features typically associated with MSO habitat, no habitat modification directly attributed to construction or maintenance is anticipated.

Increased Legal and Unauthorized Access to MSO Habitat
Incidental encounters between MSO and non-motorized recreationists are relatively insignificant in most cases (USFWS 1995a). Most MSO appear to be relatively undisturbed by small groups (< 12 people) passing nearby (USFWS 1995a) as long as the disturbance is not for an extended period of time. The potential for hikers to disturb MSOs is greatest where hiking is concentrated in narrow canyon bottoms occupied by nesting or roosting MSOs. Noise from recreationists using off-highway vehicles (OHV) on closed access roads are much more likely to disturb MSOs, especially if their activity occurs over an extended period of time in occupied MSO habitat. Increased access to MSO habitat may subject the species to poaching or other harassment.

The road closure techniques outlined in the RA (URS 2003) should minimize unintended use of temporary construction roads but probably will not prevent it entirely. However, because only a small segment of a construction road will occur within a PAC, and forest service roads already exist within the PAC, no significant increase in unauthorized vehicular access by recreationists into occupied MSO habitat is anticipated.

Accidental Wildfire

Because of their mobility, MSO will not likely be directly impacted by wildfires. However, fire suppression efforts over the past century have created a situation that may encourage catastrophic, large-scale fires. Efforts to limit such fires are of great importance to MSO conservation. Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). The short-term effects of wildfires may affect MSO prey species through direct mortality from the fire or habitat destruction. Herbaceous plant species that serve as cover and forage for small mammals could be drastically reduced. However, because of reduced groundcover, predation upon surviving small mammals by MSO may actually increase in the short term. Furthermore, increased herbaceous production in the years following a fire may improve habitat for small mammals.

New roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak efficacy in southern California came to similar conclusions (Green 1977).

If deemed appropriate, new roads may allow fuelwood collection in areas currently not accessible, thereby reducing the density of down woody material, which is capable of carrying wildfires across the landscape. Furthermore, the measures being developed for the Fire Prevention Plan will minimize the risk of wildfire associated with the proposed action.

Invasive Species

Roads may be the first point of entry for invasive species into a new landscape and may serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move away from the roadside into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires. An increased risk of fire in MSO habitats could be detrimental to the species because it would eliminate essential features, such as saguaros and desert tree species, which are not fire adapted. Fire stimulates

Lehmann's lovegrass, which in turn stimulates more fire, the result is an increase in the fire return interval at the expense of native plant species (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

Effects to Proposed Critical Habitat

While the proposed action passes through the boundaries of proposed critical habitat unit #BR-W-13, the vast majority of the area where the project is located does not contain constituent elements as outlined in the 2001 critical habitat designation (USFWS 2001a). The single exception is the construction of a 0.07 mi (0.113 km) of access road within PAC #0502015. Because all vegetation and other organic material with PACs are considered constituent elements of critical habitat, some impact to proposed critical habitat will occur. However, the habitat in the area of this proposed access road contains only manzanita (*Arctostaphylos* sp.) and small oak trees that are of insufficient size to function as MSO breeding or foraging habitat. As outlined in SECTION 1.4, no trees greater than 9 in (22.8 cm) DBH will be removed from the PAC. Furthermore, the conservation measures outlined above also will minimize the impacts from accidental wildfire, invasive species and unauthorized access on proposed critical habitat. Therefore, the impacts from the proposed action will not appreciably diminish the value of the proposed critical habitat to the survival and recovery of MSO.

2.1g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. Because the action area for this species lies entirely on USFS land, all activities are managed according to the MSO recovery plan guidelines, and future actions will be subject to the consultation requirements established under Section 7, and are not considered cumulative to the proposed action.

Although the amount of future private development within Santa Cruz County is unknown, many rural areas of Arizona are experiencing substantial growth. Between 1990 and 2000, Santa Cruz County grew by 29.3 percent (U.S. Census Bureau 2000). Despite its distance from the MSO action area, an increase in population in Nogales, and other regional population centers may translate into an increased demand for outdoor recreation, and therefore more recreational use of USFS land.

An undetermined level of border crossings by undocumented immigrants (UDI) occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase.

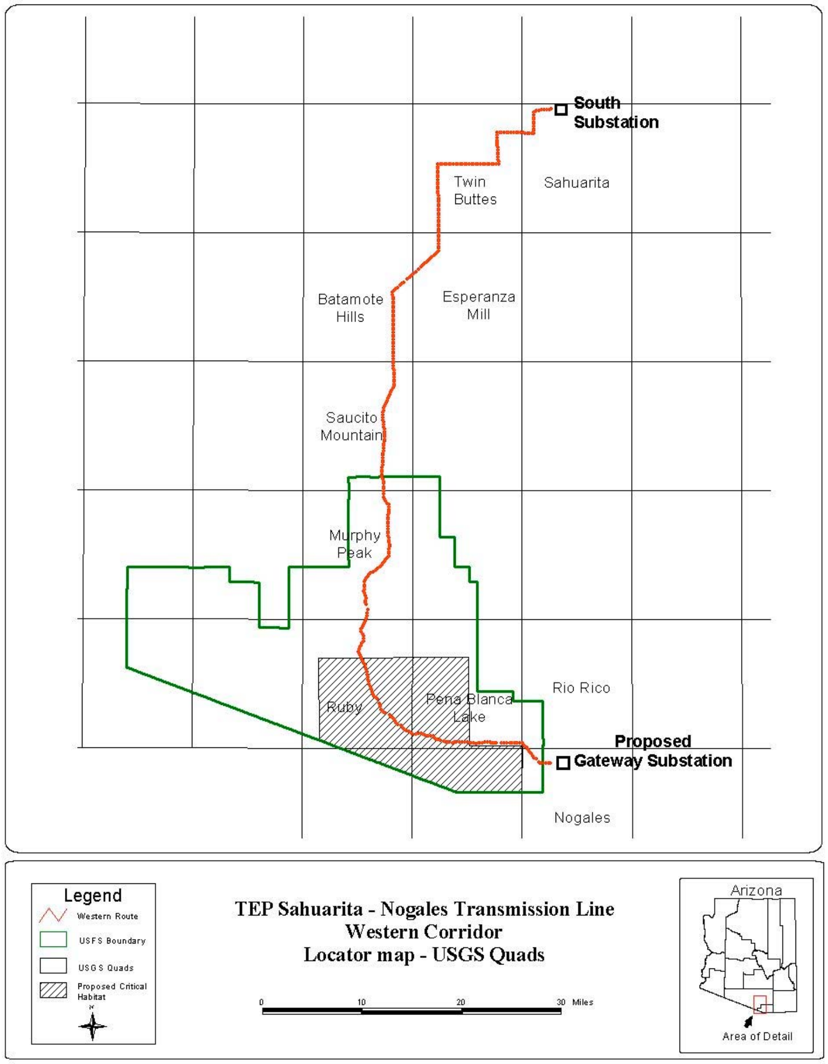

Figure 10. Location of proposed critical habitat for Mexican spotted owl as of 18 November 2003.

2.1h Effects Determination and Incidental Take

Effects to the Species

Construction noise and activities may affect MSO but is not likely to adversely affect the species, because construction will occur during a non-critical life stage and will be short term in duration.

Because the proposed action is not likely to adversely affect the MSO, no take is anticipated.

Effects to Critical Habitat

Removal of some vegetation in PAC #0502015 may affect, but is not likely to adversely modify proposed critical habitat for the MSO.

2.2 CACTUS FERRUGINOUS PYGMY-OWL (*Glaucidium brasilianum cactorum*)
(Endangered)

2.2a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. The action area for the CFPO includes those areas of habitat below 4,000 ft (1,219 m) in elevation that may be directly impacted by construction as well as potential nesting sites within 1,312 ft (400 m) of the proposed action (USFWS 2000b.) that may be subject to noise disturbance during construction. In addition, a 7.08 mi (11.4 km) buffer area surrounding the project area is included in the action area because juvenile CFPO have been documented traveling up to 7.08 mi (11.4 km) during dispersal (M. Wrigley, USFWS, pers. comm., May 2001).

2.1b Natural History and Distribution:

USFWS listed CFPO in Arizona on 10 March 1997 (USFWS 1997a) as endangered. Listing was based on historical and current evidence that suggested a significant population decline of this subspecies had occurred in Arizona. USFWS considered the loss and alteration of habitat as the primary threat to the remaining population. A recovery plan for the species is currently in development by the CFPO recovery team.

CFPO (Figure 11) are small brown birds with a cream-colored belly streaked with paler brown (Pyle 1997). The *cactorum* race; however, is described as "a well-marked, pale grayish extreme for the species" (Phillips et al. 1964). The call for this mostly diurnal owl is heard chiefly near dawn and dusk. The best field identification features are its small size, eyespots on the nape of the neck, and long reddish-barred tail, which is often nervously wagged or twitched (Monson 1998).

Figure 11. Cactus ferruginous pygmy-owl.

Originally CFPO were described as a separate subspecies based on specimens from Arizona and Sonora, Mexico. CFPO were first documented in the United States from a collection by Lieutenant Charles E. Bendire on 24 January 1872 in the "heavy mesquite thickets along creek" near the present day site of historic Camp Lowell, Tucson (Coues 1872, Bendire 1892).

Very little is known about the life history of CFPO in Arizona (Cartron et al. 2000a). Little or no literature currently exists concerning life history variables such as longevity, age distribution, and recruitment. Current studies undertaken by AGFD, USFWS, and The University of Arizona are examining these variables.

The diet of CFPO is not well understood, but they are believed to be prey generalists (Cartron et al. 2000a). Observations, stomach content analysis, and records of Texas pygmy-owls suggest that these owls have a diverse diet that includes mammals, birds, reptiles, and insects (Proudfoot and Beasom 1997).

CFPO nest in cavities of larger trees (typically defined as a tree with a trunk at least 6 in [15 cm] diameter at breast height [DBH]) or large columnar cactus. Cavities may be naturally formed (e.g. knotholes) or excavated by woodpeckers. CFPO do not construct their own nest holes. All currently known CFPO nest sites in Arizona are in woodpecker excavated cavities in saguaros. Historically, the species also has been documented nesting in cottonwood, paloverde, and mesquite trees in Arizona.

Nesting activity for this owl species in Arizona begins in late winter to early spring (Lesh and Corman 1995, Abbate et al. 1996). Little is known about its courtship flight behavior. Egg laying begins by late April with three to four eggs typically laid. It is uncertain if only one brood is hatched per year. Nestlings have been observed through the end of July. During nesting, the male brings food to the female and young (Glinski 1998).

Historically, CFPO occurred from the lowlands of central Arizona, south through western Mexico to the states of Colima and Michoacan, and from southern Texas south through the Mexican states of Tamaulipas and Nuevo Leon. In Arizona, the species was documented as far north as New River and Cave Creek in northern Maricopa County (Harris and Duncan 1999). Elsewhere in Maricopa County, the species has been found near the Yuma County line along the Gila River at Agua Caliente, along the Salt River at Phoenix, and near the Verde River confluence. The eastern most verifiable record was along the Gila River at Old Fort Goodwin, located approximately 2 mi (1.2 km) southwest of present day Geronimo, Graham County, Arizona (Aiken 1937). In the southeastern part of the state, the species has been documented in recent times near Dudleyville along the lower San Pedro River between 1985 and 1987 (Harris and Duncan 1999), and probably also along lower Aravaipa Creek in 1987 (Monson 1987). Other localities in south central Arizona include historical records in Pinal County near Sacaton and Blackwater on the Gila River Indian Reservation, and at Casa Grande (Harris and Duncan 1999). Near the Mexican border, the species has been found in Santa Cruz County near Patagonia and in Sycamore Canyon west of Nogales. A likely accidental sighting was documented once on 10 April 1955 in eastern Yuma County near the Mexican border at Cabeza Prieta Tanks on the Cabeza Prieta National Wildlife Refuge (Monson and Phillips 1981, Harris and Duncan 1998).

Surveys conducted by University of Arizona biologists in Sonora, Mexico found 280 CFPO during the 2000 survey season. CFPO within Sonora, Mexico and Arizona may have been the same population prior to agricultural expansion within the last 75 years. However, due to isolation, the genetic connection of the Arizona population to owls in the nearby state of Sonora, Mexico may be tenuous (USFWS 2002a).

CFPO have been documented in several habitat types in the northern portion of its range in Arizona and adjacent Mexico. In Arizona, these include streamside Sonoran riparian deciduous forest and woodland associations and Sonoran desertscrub. CFPO also inhabit

Sinaloan deciduous forest and thornscrub in Mexico (not discussed here). The streamside associations include such species as cottonwood, ash, netleaf hackberry, willows, velvet mesquite, and others. The Sonoran desertscrub associations are composed of relatively dense saguaro cactus stands associated with short trees such as paloverde, mesquite, and ironwood (*Olneya tesota*), and an open understory of triangle-leaf bursage, creosote, and various other cacti and shrubs. Throughout its range, CFPO occur at low elevations, generally below 4,000 ft (1,219 m).

CFPO found in Sonoran desertscrub habitats are typically associated with structurally diverse stands of desert riparian scrub with saguaros along washes (Wilcox et al. 2000). Such habitat is often referred to as xeroriparian vegetation (Johnson and Haight 1985). These washes have no permanent water flow. Instead, flow is intermittent and based on seasonal rainfall as well as strength and duration of individual storms. Desert riparian scrub vegetation is easily recognizable by the presence of a linear assemblage of trees and shrubs that grow along the wash. Density is higher and taller than the sparse desertscrub vegetation that typically exists in the adjacent uplands. Before listing the species as endangered, all known CFPO were documented in such Sonoran desertscrub habitat (Lesh and Corman 1995, Abbate et al. 1996).

At the northern periphery of the subspecies range in southern Arizona, CFPO distribution and preferred habitat is not well understood. It is believed CFPO require the cover of denser wooded areas with understory thickets, like riparian habitat, for nesting, foraging, and predator avoidance (Abbate et al. 2000). Riparian habitat also is known for its high density and diversity of animal species that constitute the prey base of CFPO.

A significant decline in the Arizona population has occurred over the past several decades (USFWS 1997a, Richardson et al. 2000). Loss or modification of habitat from woodcutting, agriculture, groundwater pumping, and related human activities has presumably contributed to the population decline (USFWS 1997a).

2.1c Critical Habitat

On 12 July 1999, USFWS designated approximately 731,712 ac (296,113 ha) of critical habitat supporting riverine, riparian, and upland vegetation in seven critical habitat units, located in Pima, Cochise, Pinal, and Maricopa counties of Arizona (USFWS 1999). However, on 21 September 2001, the U.S. District Court for the State of Arizona vacated this final rule designating critical habitat for CFPO, and remanded its designation back to the USFWS for further consideration. On 27 November 2002, USFWS proposed designating 1.2 million ac (485,000 ha) of critical habitat for CFPO in southern Arizona (Federal Register Vol. 67, No 229:71031-71064). The proposed action does not enter any areas proposed as critical habitat.

2.1d Current Status Statewide

USFWS determined that CFPO in Arizona were endangered because of the following factors (USFWS 1997a):

- present or threatened destruction, modification, or curtailment of its habitat or range;
- inadequacy of existing regulatory mechanisms;
- other natural and manmade factors, which include low genetic viability.

Surveys conducted statewide during the 2002 season confirmed a total of 18 adult CFPO and three nests in Arizona. Similar to the previous four years, there was greater than 50 percent fledgling mortality documented in 2002, with only one juvenile confirmed surviving dispersal (S. Richardson, USFWS, pers. comm., 3 December 2002).

One of most urgent threats to CFPO in Arizona is thought to be the loss and fragmentation of habitat (USFWS 1997a, Abbate et al. 1999). The complete removal of vegetation and natural features required for many large-scale and high-density developments directly and indirectly impacts CFPO survival and recovery (Abbate et al. 1999). In recent decades, CFPO riparian habitat has continually been modified and destroyed by agricultural development, woodcutting, urban expansion, and general watershed degradation (Phillips et al. 1964, Brown et al. 1977, State of Arizona 1990, Bahre 1991, Stromberg et al. 1992, Stromberg 1993a and 1993b). Sonoran desertscrub has been affected to varying degrees by urban and agricultural development, woodcutting, and livestock grazing (Bahre 1991). Pumping of groundwater and the diversion and channelization of natural watercourses are also likely to have reduced CFPO habitat.

Proudfoot and Slack (2001) found that CFPO in northwestern Tucson may be isolated from other populations in Arizona and Mexico. Low genetic variability can lead to a reduction in reproductive success and environmental adaptability. In 1998 and 1999, two cases of sibling CFPO pairing and breeding were documented (Abbate et al. 1999). In both cases, young were fledged from the nesting attempts. These unusual pairings may have resulted from extremely low numbers of available mates within dispersal range, and/or from barriers (including fragmentation of habitat) that have influenced dispersal and limited the movement of young owls (Abbate et al. 1999).

Soule (1986) notes that very small populations are in extreme jeopardy due to their susceptibility to a variety of factors, including variations in birth and death rates that can result in extinction. In small populations such as with CFPO, each individual is important for its contribution to the genetic variability of that population.

2.1e Environmental Baseline

CFPO habitat north of Sahuarita Road consists of Sonoran desertscrub with relatively high species diversity and structural diversity, including scattered saguaro cacti containing potential nesting cavities. This area is within Survey Zone 1 (USFWS 2000) and has the highest potential for occupancy of the entire action area. Land status in this area is a mixture of private and state land. The Mission Mine Complex also is located within this section of the proposed action and grazing occurs on much of the state lands in the area.

CFPO habitat south of Sahuarita Road consists primarily of semi-desert grassland dominated by mesquite and acacia trees, mixed-cacti, ocotillo, yucca, and grasses, including non-native Lehmann's lovegrass (*Eragrostis lehmanniana*). The area is primarily undeveloped, but does contain some existing electrical distribution lines and associated roads (Figure 12) as well as low density housing developments. These grasslands are transected by desert riparian scrub dominated by mesquite and netleaf hackberry trees. Some areas of deciduous riparian forests are also found south of Arivaca Road in Sopori Wash and Peck Canyon. Land jurisdictions in this area include private, state, BLM, and USFS.

Figure 12. Example of existing disturbance within corridor.

CFPO surveys were conducted by Harris Environmental Group, Inc. (HEG) biologists in 2001 and 2002 (data previously submitted to USFWS) in accordance with the approved protocol (USFWS 2000b). Surveys were conducted in Sonoran desertscrub habitat where saguaros were present and in desert riparian scrub and deciduous riparian habitat that contained large trees (over 15.2 cm [6 in] DBH). However, no surveys were conducted in deciduous riparian habitat within Sopori Wash. Surveys were conducted at 142 call points in 2001 and 140 call points in 2002. No CFPOs were detected during either survey year.

The only historical records of CFPO within the Nogales Ranger District (RD) of the CNF are in Sycamore Canyon (CNF 2000) and a dispersing juvenile in the Jarillas Allotment. USFS surveys in Sycamore Canyon in 1997 and 1998 did not locate CFPO. Additionally, USFS personnel surveyed 2,300 ac (930 ha) in 1999 with negative results and conducted 58 habitat assessments for CFPO habitat (CNF 2000). The habitat assessments identified four areas that ranked high enough to warrant CFPO surveys. No CFPO have been detected during surveys of these four areas (T. Newman, CNF, pers. comm., 9 October 2002).

2.1f Effects of Proposed Action on the CFPO

<u>Direct Effects</u>

Vehicle and Powerline Collisions

CFPO collisions with windows and fences have been documented in the Tucson area (USFWS 2002a), and observations of low flying CFPO across roadways indicate vehicle collisions are a realistic hazard (Abbate et al. 1999). While CFPO may be active during daylight, no CFPO have been detected within the action area, therefore, CFPO collisions with construction related vehicles are unlikely.

There is a small risk of a CFPO collision with power lines, however, raptors have lower rates of collision with power lines than passerine birds (McNeil et al. 1985). This reduced collision rate may be due to visual acuity, maneuverability, and non-flocking tendencies (Nobel 1995). To minimize the risk of powerline collisions, TEP will construct the proposed transmission line following the guidelines outlined in "Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 1996" (APLIC 1996).

Electrocution
Because power structures and towers are attractive perching and nesting sites for some raptor species, significant raptor mortality from electrocution has been reported in North America (Harness and Wilson 2000). Electrocution occurs when a bird simultaneously touches two phase conductors or a conductor and a ground wire (Bevanger 1994). Most electrocutions occur on distribution lines (34-kV or less) rather than on transmission lines (69-kV or more), primarily because clearances between wires on distribution lines are less and distribution lines have an array of uninsulated, structure-mounted equipment (Marti 2002). To minimize the risk of raptor electrocutions, TEP will construct the proposed transmission line following the guidelines outlined in "Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 1996" (APLIC 1996). Furthermore, on the structures to be used in the proposed action, the distance between the power lines is at least 18 ft (5.5 m). Because the average wingspan of an adult CFPO is 15 in (38 cm), there is no foreseeable risk of electrocution.

Construction Noise and Activity
Although no CFPO have been detected in the project area, short term noise disturbance and human activity associated with construction may discourage CFPO from using habitat within and adjacent to the proposed ROW. Human activity near nest sites at critical periods of the nesting cycle may cause CFPO to abandon their nests (USFWS 2002a). While CFPO may tolerate low level noise disturbances, such as those in low density residential areas (Cartron et al. 2000b), they will probably not tolerate noise levels associated with construction activities in close proximity to a nest. The greatest likelihood of noise disturbance will result from the use of helicopters during the installation of the transmission lines, but also could result from the presence of heavy machinery or large groups of construction personnel. If CFPO are not detected during the two consecutive years of protocol surveys, the potential for direct impacts to this species is minimal.

Indirect Effects

Habitat Modification and Fragmentation
The proposed action will result in the disturbance of areas that could provide potential nesting, foraging, and dispersal habitat for CFPO. Because many access roads will be closed and restored and all disturbed areas will be reseeded, this disturbance will be temporary. The proposed action could potentially result in temporary disturbance to habitat from access roads and structure installations in the following amounts: 34 acres (13.76 ha) in Sonoran desertscrub, 41.27 acres (16.70 ha) in desert riparian scrub, and 0.05 acres (0.02 ha) in deciduous riparian.

While all large saguaros within construction sites will be transplanted, construction could temporarily degrade CFPO habitat by removing vegetation that provides forage and shelter. Elimination of groundcover plant species, rodent burrows, and native soils, as well as loss of trees and shrubs, may impact local reptile and bird populations that are important to the pygmy-owl diet. Loss of complex vegetation structure increases energy demands on owls that must forage at greater distances and risk exposure to a variety of hazards (Abbate et al. 1999). Because of the linear nature of the proposed action, these impacts will be widely distributed and relatively minor in any single area.

Increased Legal and Unauthorized Access to CFPO Habitat
Although CFPO have not been detected in the project area, recreationists may access potential CFPO habitat using temporary construction roads associated with the proposed action. While hikers and other non-motorized recreationists will create minimal disturbance, noise from Off Highway Vehicle (OHV) users are much more likely to disturb CFPO, especially if the activity occurs over an extended period of time in or near a CFPO nesting territory. Increased access to CFPO habitat may subject the species to poaching or other harassment. While TEP will prevent unauthorized access to the ROW across private land, closure of the ROW on public land, particularly state land, is not feasible. Therefore, some increase in access to potential CFPO habitat is anticipated.

Accidental Wildfire
Increased road access may contribute to an increase in the frequency of human caused ignitions in some areas (Gucinski et al. 2001). Because of their mobility, CFPO will not likely be directly impacted by wildfires. However, wildfires may destroy columnar cacti and trees that provide nesting cavities as well as affect CFPO prey species through direct mortality from the fire or habitat destruction. Herbaceous plant species that serve as cover and forage for small mammals could be drastically reduced. Because of reduced groundcover, predation upon surviving small mammals by CFPO may actually increase in the short term. Furthermore, increased herbaceous production in the years following a fire may improve habitat for small mammals in the long term.

New roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977).

The measures outlined in the Fire Prevention Plan will minimize the risk of wildfire associated with the proposed action.

Invasive Species
Roads may be the first point of entry for invasive species into a new landscape and may serve as a corridor along which plants move farther into the landscape (Lonsdale and

Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move away from the roadside into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires. An increased risk of fire in CFPO habitats could be detrimental to the species because it would eliminate essential features, such as saguaros and desert tree species, which are not fire adapted. Fire stimulates Lehmann's lovegrass, which in turn stimulates more fire, the result is an increase in the fire return interval at the expense of native plant species (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.1g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. While the action area for this species crosses private, state, and federal lands, the habitat with the highest potential for occupancy by CFPO occurs on state and private lands in Pima County. Future federal actions on these lands will be subject to Section 7 consultation. These actions will not be considered cumulative.

Although the amount of future private development within the action area is unknown, many rural areas of Arizona are experiencing substantial growth. Pima County grew by 26.5 percent between 1990 and 2000 (U.S. Census Bureau 2000). Because of the growth rate and the development pressures from nearby Tucson and Sahuarita, it is foreseeable that land adjacent to the proposed ROW will be developed. These developments will likely include increases in associated infrastructure such as roads, groundwater use, and commercial services, all resulting in the degradation of CFPO habitat.

An undetermined level of border crossings by undocumented immigrants occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase. Additionally, agriculture, recreation, OHV use, grazing, and other activities continue to occur on private and state land and adversely affect CFPO and their habitats.

2.1h Effects Determination and Incidental Take

While CFPO are not currently known to occupy the action area, the disturbance of potential habitat from construction activities and increased access may affect, and are likely to adversely affect, this species.

Take of CFPO is not anticipated because construction activities during breeding season will only occur following protocol surveys and the Conservation Measures outlined in SECTION 1.4 will minimize disturbance to potential habitat and prevent disturbance to nesting CFPO within the action area should any be detected in the future.

2.2 SOUTHWESTERN WILLOW FLYCATCHER (*Empidonax traillii extimus*) (Endangered)

2.2a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. Potential migratory habitat for the SWFL includes those areas of Sopori Wash with riparian habitat similar to that described by Sogge et al. (1997). The action area for this species consists of the Sopori Wash both within the proposed ROW as well as the surrounding Sopori Wash watershed.

2.2b Natural History and Distribution

SWFL (Figure 13) are small passerine bird (Order Passeriformes; Family Tyrannidae) measuring approximately 5.75 in (14.6 cm) in length from the tip of the bill to the tip of the tail and weighing 0.4 ounces (11.34 grams). This species has a grayish-green back and wings, whitish throat, light gray-olive breast, and pale yellowish belly. Two white wingbars are visible (juveniles have buffy wingbars). The eye ring is faint or absent. The upper mandible is dark and the lower is light yellow grading to black at the tip. SWFL are riparian obligate species, nesting along rivers, streams, and other wetlands where dense growths of willow, seepwillow (*Baccharis* sp.), buttonbush (*Cephalanthus* sp.), boxelder (*Acer negundo*), saltcedar (*Tamarix chinensis*), carrizo (*Phragmites australis*) or other plants are present, often with a scattered overstory of cottonwood and/or willow.

Figure 13. Southwestern willow flycatcher.

One of four currently recognized willow flycatcher subspecies (Phillips 1948, Unitt 1987, Browning 1993), SWFL are neotropical migratory species that breed in the southwestern U.S. from approximately 15 May to 1 September. This species migrates to Mexico, Central America, and possibly northern South America during the non-breeding season (Phillips 1948, Stiles and Skutch 1989, Peterson 1990, Ridgely and Tudor 1994, Howell and Webb 1995). The historical range of SWFL included southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, extreme southern Nevada, and extreme northwestern Mexico (Sonora and Baja) (Unitt 1987).

SWFL breed in dense riparian habitats from sea level in California to just over 7,000 ft (2,134 m) in Arizona and southwestern Colorado. Historic egg/nest collections and species descriptions throughout SWFL range describe the widespread use of willow for nesting (Phillips 1948, Phillips et al. 1964, Hubbard 1987, Unitt 1987, San Diego Natural History Museum 1995). Currently, SWFL primarily use Geyer willow (*Salix geyeriana*), Goodding willow (*Salix gooddingii*), boxelder, saltcedar, Russian olive (*Elaeagnus angustifolio*), and live oak (*Quercus agrifolia*) for nesting. Other plant species less commonly used for nesting include: buttonbush, black twinberry (*Lonicera involucrata*), cottonwood, white alder (*Alnus rhombifolia*), blackberry (*Rubus ursinus*), carrizo, and stinging nettle (*Urtica* spp.). Nesting SWFL exhibit a strong preference for dense vegetation at the nest site, but high variation and density of vegetation at the patch scale (Hatten et al. 2000). Nesting sites are typically close to the edge of the vegetation patch and close to water (Allison et al. 2000). Based on the diversity of plant species composition and complexity of habitat structure, four basic nesting habitat types can be described for SWFL: monotypic willow, monotypic exotic, native broadleaf dominated, and mixed native/exotic (Sogge et al.1997).

Open water, cienegas, marshy seeps, or saturated soil are typically in the vicinity of SWFL territories and nests; SWFL sometimes nest in areas where nesting substrates are in standing water (Maynard 1995, Sferra et al. 1995, 1997). Hydrological conditions at a particular site can vary remarkably in the arid southwest within a season and between years. At some locations, particularly during drier years, water or saturated soil is only present early in the breeding season (i.e., May and part of June). However, the total absence of water or visibly saturated soil has been documented at several sites where the river channel has been modified (e.g. creation of pilot channels), where modification of subsurface flows has occurred (e.g. agricultural runoff), or as a result of changes in river channel configuration after flood events (Spencer et al. 1996). Throughout their range, SWFL arrive on breeding grounds in late April and May (Sogge and Tibbitts 1992, Sogge et al. 1993, Sogge and Tibbitts 1994, Muiznieks et al. 1994, Maynard 1995, Sferra et al. 1995, 1997). Nesting begins in late May and early June, and young fledge from late June typically through mid August, but as late as early September.

SWFL are insectivores, foraging in dense shrub and tree vegetation along rivers, streams, and other wetlands. Flying insects are the most important SWFL prey item; however, they will also glean larvae of non-flying insects from vegetation (Drost et al. 1998). Drost et al. (1998) found that the major prey items of SWFL (in Arizona and Colorado), consisted of true flies (Diptera); ants, bees, and wasps (Hymenoptera), and true bugs (Hemiptera). Other insect prey taxa include leafhoppers (Homoptera: Cicadellidae), dragonflies and damselflies (Odonata); and caterpillars (Lepidoptera larvae). Non-insect prey include spiders (Araneae), sowbugs (Isopoda), and fragments of plant material.

2.2c Critical Habitat

Critical habitat for SWFL was originally designated on 22 July 1997 (USFWS 1997b), but on 11 May 2001, the 10th Circuit Court of Appeals set aside the critical habitat designation and instructed USFWS to issue a new designation in compliance with the court ruling. USFWS is currently soliciting information regarding areas important for the conservation of this species in order to re-propose critical habitat.

2.2d Current Status Statewide

The following status of SWFL in Arizona was summarized from Smith et al. (2002). In 2001, 177 sites covering approximately 139 mi (225 km) of riparian habitat were surveyed for SWFL in Arizona. Sites range from 98 ft (30 m) to 8,802 ft (2,683 m) in elevation and 98.5 ft (30 m) to 10 mi (16.1 km) in length. The mean site length was 1 mi (1.6 km). Fifty-two of the 177 sites were not surveyed according to protocol. This was due to time or funding limitations or because unsuitable SWFL habitat was found during the first survey. Of the 177 sites, 20 had not been previously surveyed. Most new survey sites were located along the Colorado River (n = 9) and Gila River (n = 4). Six hundred thirty-five resident SWFL were documented within 346 territories at 46 sites. AGFD personnel and statewide cooperators recorded 311 pairs.

SWFL were documented along 11 drainages. The greatest concentrations of SWFL were found at Roosevelt Lake (40 percent) and the Winkelman Study Area (35 percent). Resident SWFL were detected at five sites that had been surveyed at least once in previous years. Resident SWFL were documented in two drainages (Virgin River and Cienega Creek) for the first time since protocol surveys began. No historical occurrence record exists for SWFL along the Virgin River and SWFL have not been reported at Cienega Creek since 1964. These colonizations yield evidence of habitat restoration potential in these drainages that can aid in recovery of the SWFL.

2.2e Environmental Baseline

The section of Sopori Wash crossed by the proposed action supports a mixed riparian assemblage with mature but discontinuous Fremont cottonwood and netleaf hackberry along the banks and a midstory of large mesquite (HEG Field Notes, C. Hisler, AGFD, pers. comm., 18 July 2002) (Figure 14). Understory density is relatively low. Uplands surrounding Sopori Wash are characterized by semidesert grassland and are subject to grazing.

Figure 14. Riparian habitat in Sopori Wash

This reach of Sopori Wash is ephemeral, and water is probably present only for short periods of time following precipitation events. Because of the patchy habitat and lack of surface water, this area will likely be used only by migratory SWFL. The nearest recent (1999) reports of SWFL are from the Santa Cruz River between Tubac and Rio Rico, approximately 6 mi (10 km) to 12 mi (20 km) away (McCarthey et al. 1998, Paradzick et al. 1999, Paradzick et al. 2000). All of these reports were of migrant SWFL.

2.2f Effects of Proposed Action on the SWFL

<u>Direct Effects</u>
Because the proposed action does not impact suitable breeding habitat, no direct impacts to SWFL are anticipated.

<u>Indirect Effects</u>
Habitat Modification and Fragmentation
Some indirect impacts to SWFL may result from modifications to potential migratory habitat associated with the installation of structures within the Sopori Wash floodplain. Roads in this area will be limited to a width of 12 ft (4 m), resulting in the disturbance of 0.14 acres (0.06 ha) of deciduous riparian habitat. Because disturbed cottonwood and willow specimens will be mitigated at a 2:1 ratio, and riparian vegetation can recover quickly following minimal disturbance, any adverse effects to SWFL habitat will be temporary.

Increased Legal and Unauthorized Access to SWFL Habitat
Because this section of Sopori Wash is on a private ranch, unauthorized recreational access to this section of Sopori Wash via the temporary construction roads associated with the proposed action should not occur. Therefore, no disturbance of SWFL or habitat modification from increased access is anticipated.

Accidental Wildfire
Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). However, because new roads in this area will not be open to the public, increased risk of wildfire because of increased access will be negligible. The measures outlined in the Fire Prevention Plan will minimize the risk of wildfire associated with the proposed action.

Invasive Species
Roads may be the first point of entry for invasive species into a new landscape and may serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move away from the roadside into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires. An increased risk of fire in CFPO habitats could be detrimental to the species because it would eliminate essential features, such as saguaros and desert tree species, which are not fire adapted. Fire stimulates Lehmann's lovegrass, which in turn stimulates more fire, the result is an increase in the

fire return interval at the expense of native plant species (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.3g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. Most land within the action area consists primarily of ASLD land with blocks of private parcels on either side of Arivaca Road. Federal actions will, on these lands, be subject to Section 7 consultation; these actions will not be considered cumulative.

Although the amount of future private development within the action area is unknown, many rural areas of Arizona are experiencing substantial growth. Between 1990 and 2000, Pima County grew by 26.5 percent and Santa Cruz County by 29.3 percent (U.S. Census Bureau 2000). Because of these growth rates and the trend of rural development to occur in areas with some existing infrastructure, it is foreseeable that the private ranches adjacent to Arivaca Road could be sold and subdivided for residential homes and ranchettes. Any substantial population increase in the area also could increase demands for access to recreational lands, increase groundwater pumping, and foster development of commercial services. These impacts to the watershed could degrade the value of habitat within Sopori Wash, thereby preventing its use by SWFL.

An undetermined level of border crossings by UDI occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase.

2.3h Effects Determination and Incidental Take

The disturbance of potential migratory habitat may affect the SWFL, but it is not likely to adversely affect the species, because the disturbance is temporary and relatively small in area.

Because the proposed action is not likely to adversely affect the species, no take of SWFL is anticipated.

2.4 LESSER LONG-NOSED BAT (*Leptonycteris curasoae yerbabuenae*) (Endangered)

2.4a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. Potential roosting habitat occurs in the Tumacacori and Atascosa/Pajarito mountains, and foraging habitat occurs through those portions of the proposed ROW that contain agave and saguaro cacti. Because LLNB have been documented foraging up to 40 mi (64 km) from roost sites, the action area for the LLNB consists of all potential foraging and roosting habitat within a 40 mi (64 km) buffer surrounding the proposed action.

2.4b Natural History and Distribution

The LLNB (formerly Sanborn's long-nosed bat) is one of three members of American leaf-nosed bats (Family Phyllostomidae) in Arizona (Hoffmeister 1986). The LLNB (Figure 15) is one of the larger Arizona bats, and gray to reddish-brown in color. This bat has an erect triangular flap of skin (nose leaf) at the end of a long slender nose. The LLNB can be distinguished from *Macrotus* by its much longer nose, greatly reduced tail membrane, and smaller ears; and from *Choeronycteris,* which has a shorter tail, larger tail membrane, and longer, narrower nose.

Figure 15. Lesser long-nosed bat.

LLNB occur from the southern United States to northern South America, including several islands and the adjacent mainland of Venezuela and Colombia. LLNB occurs between 4 degrees to 32 degrees N latitude, typically in semiarid to arid regions (Nowak 1994). This bat is typically associated with their primary food source, flower nectar and fruit of columnar cacti and certain agave species. Because of the seasonal nature of the food source, LLNB migrate to follow flowering and fruiting plants. In addition to food availability, there must be suitable roosting within commuting distance of the food source. Currently, the longest known commute distance is about 30 mi (48 km).

The primary range of this bat lies in Mexico and Central America. Occurrences in Arizona probably represent range expansion. Prior to the 1930s, there are no records of LLNB in Arizona (Cockrum 1991). Colossal Cave and the Old Mammon Mine are the most northern sites known to house colonies of these bats. However, these sites support colonies of about 5,000 individuals, versus sites in Mexico, which are as large as 150,000 individuals.

LLNB have a bi-seasonal occurrence in Arizona. The maternity season, when bats migrate to southwestern Arizona, represents a United States population of about 30,000 individuals. The fall agave flowering season, located in southeastern Arizona, which attracts about 70,000 bats. Each of these areas contains three known primary roosts and some number of secondary/transient or night roosts (sheltering tens to a few hundred individuals/site).

With the exception of a small bachelor roost located in the Chiricahua Mountains, all remaining records represent very small numbers (usually single individuals) at hummingbird feeders, caught in mist nets, or chance findings in residential areas. Constantine (1966) reported two immature females from Maricopa County, one in Phoenix on 30 August 1963 and the other in Glendale on 16 September 1963. The Glendale specimen was found dead. The other was hanging on a screen door (not a normal place) indicating something was likely wrong with that bat. He also reported two males from southern California: one was taken alive on 3 October 1993 outside a home in Yucaipa, the other was taken on 18 October 1996 from the outside of a building in Oceanside (Constantine 1998). LLNB also have been reported from the Aravaipa Canyon area (Cockrum 1991). Hoffmeister (1986) has a record in the Santa Catalina Mountains, but Cockrum (1991) states it was probably a transcription error because the nectar-feeding bats found there belong to the genus *Choeronycteris*. However, Cockrum (1991) does report LLNB from the Santa Catalina Mountains but only once in a mist net set in Sabino Canyon (a female in June).

The diet of LLNB in Arizona consists primarily of the nectar, pollen, and ripe fruit of columnar cacti (particularly saguaro) and agave (e.g., *Agave chrysantha*, *A. deserti*, *A. palmeri*, and *A. parryi*). The LLNB has been demonstrated to be a significant pollinator of saguaros, organpipe cacti (*Stenocereus thurberi*), and agaves (Howell and Roth 1981, Alcorn et al. 1962, and McGregor et al. 1962). Generally, LLNB in Arizona forage after dusk to nearly dawn during the months of May through September. In a single night, LLNB will forage well away from daytime roost sites. In Sonora, Mexico, bats feed on the mainland by night at Bahia Kino and roost by day on Isla Tiburon, 15 mi (24 km) to 20 mi (32 km) away. The closest sizable densities of columnar cacti to LLNB roosts in the Sierra Pinacate, Sonora, Mexico, are found in Organpipe Cactus National Monument in Arizona, about 25 mi (40 km) to 30 mi (48 km) away (Fleming 1991).

In Arizona, females arrive in late March and early April, then migrate northward through Mexico along a “nectar corridor” provided by columnar cacti such as saguaro and organpipe (Fleming 1991). Female LLNB usually arrive in Arizona pregnant and congregate in traditional maternity roosts at lower elevations, feeding primarily on saguaro nectar (Cockrum 1991). Later in the summer the adult males arrive and along with dispersing members of the maternity roosts, roost at higher elevations, especially within proximity to significant stands of flowering agave.

LLNB are gregarious and form large maternity colonies that number in the thousands (Hayward and Cockrum 1971, Hoffmeister 1986). All four of the verified maternity roosts of LLNB in the United States are found in Arizona (Cockrum 1991). The largest and most important of the four is found in a mine located in Organpipe Cactus National

Monument. About 15,000 LLNB use this mine as a maternity roost. Young are typically born between mid-May and early June (Cockrum 1991, Hayward and Cockrum 1971).

While in the roost during the day, LLNB engage in various activities such as flying, suckling of young, grooming, resting, and interacting with neighbors. LLNB are particularly active during the day and any disturbance, such as aircraft fly-overs or other human activities, may cause an expenditure of extra energy (Dalton and Dalton 1993, Dalton et al. 1994). Female LLNB gathered in large maternity colonies are particularly vulnerable to disturbances. Maternity colonies are more sensitive because of the vulnerability of nonvolant young, whose recruitment into the population is essential to maintain a viable population.

2.4c Critical Habitat
No critical habitat has been designated for this species.

2.4d Current Status Statewide
USFWS listed this species as endangered throughout its range in the southwestern United States and Mexico on 30 September 1988 (USFWS 1988). Loss of roost and foraging habitat, as well as direct taking of individual bats during animal control programs, particularly in Mexico, have contributed to the current endangered status of the species. All available information on the species through 1994 was summarized in the Lesser Long-nosed Bat Recovery Plan approved in 1997 (Fleming 1994). The Plan indicates that the species is not in danger of extinction in Arizona or Mexico. The species still warrants some protection, as it is vulnerable to human disturbance at roost sites. There also is particular concern for the protection of forage plants from disturbance or destruction, particularly near roost sites.

Primary threats to LLNB populations are agave harvesting and human disturbance of roosting and maternity colonies. Suitable day roosts and suitable concentrations of food plants are the two resources that are crucial for the LLNB (Fleming 1995). The USFWS determined that the LLNB was endangered because of the following factors (USFWS 1988):

- A long-term decline in population
- Reports of absence from previously occupied sites
- Decline in the pollination of certain agaves

In Arizona and Mexico, there are 16 large known roosts (Fleming 1995). According to surveys conducted in 1992 and 1993, the number of bats estimated to occupy these sites was greater than 200,000. Twelve major maternity roost sites are known from Arizona and Mexico. Disturbance of these roosts or removal of the food plants associated with them could lead to the loss of the roosts. Limited numbers of maternity roosts may be the critical factor in the survival of this species.

2.4e Environmental Baseline

No LLNB roosts are known from the proposed corridor, but field surveys did locate small caves and crevices nearby that could serve as LLNB day roosts (HEG 2002, unpublished data). Furthermore, unsurveyed caves, mineshafts, and adits, which may provide suitable roost sites, occur within the Tumacacori-Atascosa mountains. The two closest known LLNB roost sites are the Cave of the Bells in the Santa Rita Mountains, approximately 20 mi (32 km) to the west, and a cave in the Patagonia Mountains, approximately 35 mi (56 km) to the west. Both of these roost sites are within the known flight distance to the proposed action and LLNB may utilize the proposed corridor for foraging.

Saguaro cacti occur within proposed corridor north of Duval Mine Road, and agaves are present in varying densities south of Arivaca Road. While the exact densities of agaves and saguaro cacti were not determined for this BA, CNF estimates that Palmer's agave is widely scattered over 1 million acres (400,000 ha) at densities of 10 to 200 per acre, generally between the elevations of 3,000 ft (914 m) and 6,000 ft (1,829 m) (USFWS 2002b). Parry's agave is found between 5,000 ft (1,524 m) and 8,200 ft (2,500 m) and begins blooming in mid-spring.

The northern portion of the proposed action is primarily undeveloped but contains some existing electrical distribution lines as well as low-density housing developments near Sahuarita Road. The Mission Mine Complex also is located within this section of the project area. The proposed action passes through the Tumacacori EMA of the CNF. Range condition in areas crossed by the proposed action is moderately high with a stable or unknown trend. While agaves have persisted in areas grazed for more that 100 years, mortality through direct herbivory and trampling is known to occur. There is a forest-wide study to determine the effects of livestock grazing on agaves currently underway (USFWS 2001b). Livestock stocking rates for the allotments within the Tumacacori EMA range from 1,320 AUMs in the Peña Blanca Allotment to 2,400 AUMs in the Bear Valley Allotment. Allotment Management Plans for Bear Valley and Sardinia Allotments are currently being revised.

2.4f Effects of Proposed Action on the LLNB

<u>Direct Effects</u>

Construction Noise and Activity

Although no LLNB roosts have been detected within the proposed corridor, short-term noise disturbance and human activity associated with construction activities may disturb LLNB if they are present in undetected roosts adjacent to the proposed corridor. The greatest likelihood of noise disturbance will result from the use of helicopters during the installation of the transmission lines, but could also result from the presence of heavy machinery or large groups of construction personnel in close proximity to an undetected roost. The consequences of disturbance to small numbers of LLNB in day roost will be less serious than disturbance of large aggregations of bats at one location.

<u>Indirect Effects</u>

Habitat Modification

Indirect effects to LLNB may result from the potential reduction in forage resources (agave and saguaro) during construction of temporary access roads or the installation of transmission structures. Because agave and saguaro are unevenly distributed and the nectar they provide is seasonally and geographically separated, the loss of significant numbers of either species may alter LLNB foraging patterns and roost selection within the action area. Even if the loss of a high-density patch of flowering agaves does not cause the abandonment of a roost, bat survivorship may be reduced through increased foraging flight distances and related energy expenditures, and increased exposure to predators. Because of the linear nature of the proposed action, however, these impacts will be widely distributed and relatively minor in any single area.

Although all agave and saguaro cacti disturbed as a result of the proposed action will be transplanted immediately outside of the construction zone, the long-term survival and future flowering of these specimens is uncertain. Agaves are typically easy to cultivate in warm climates with well-drained soils (Gentry 1982), but no long-term studies of agave transplant survival have been conducted. Transplantation of saguaro cacti is a common practice within Pima County, but preliminary results from a 10-year study of saguaro indicate that smaller saguaros (< 16 ft [5 m] tall) are more successfully transplanted than larger saguaros (HEG, unpublished data). It may take several years for saguaro cacti to die from a mortal injury, and so it is necessary to monitor transplants for many years in order to evaluate success.

Even in areas where no agaves or saguaro cacti presently exist, dormant seeds may be present in the soil. Construction activities associated with the proposed action may compact soil and alter water infiltration, which may prohibit seeds germination.

Increased Legal and Unauthorized Access to LLNB Habitat

Because LLNB are sensitive to human disturbance (to the point of temporarily abandoning a day roost after a single human intrusion) increased human access to roost sites could negatively impact LLNB. New roads on state land will not likely result in disturbance to undetected roosts because few areas in this area the support rock outcroppings, caves, and mine shafts necessary for LLNB roosts. The greatest potential for undetected roosts occurs on CNF land. The road closures on CNF land outlined in SECTION 1.4 and in the RA (URS 2003) will minimize the probability of increased human access and disturbance of LLNB in undetected roosts in these areas.

Accidental Wildfire

Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). Agave in desert grasslands have evolved with fire, but unnaturally high fire frequency and intensity can lead to decline or elimination of agave populations. Furthermore, agave mortality from fire may affect the abundance and distribution of blooming agaves for a number of years, especially if there is high mortality within certain age and size classes.

New roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977). If deemed appropriate, new roads may allow fuelwood collection in areas currently not accessible, thereby reducing the density of downed, woody material, which is capable of carrying wildfires across the landscape.

The measures outlined in the Fire Prevention Plan being developed will minimize the risks of wildfires associated with the proposed action.

Invasive Species
Roads may be the first point of entry for invasive species into a new landscape and may serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move away from the roadside into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires. An increased risk of fire in CFPO habitats could be detrimental to the species because it would eliminate essential features, such as saguaros and desert tree species, which are not fire adapted. Fire stimulates Lehmann's lovegrass, which in turn stimulates more fire, the result is an increase in the fire return interval at the expense of native plant species (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.4g Cumulative Effects
Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. The action area for this species crosses private, state, and federal lands. Future federal actions on USFS land will be subject to Section 7 consultation but these actions will not be considered cumulative. Because the action area for this species includes a 40 mi (64 km) buffer, some of the future planned actions on private and state lands in southern Pima County and much of Santa Cruz County may be considered cumulative.

Although the amount of this future private development within the action area is unknown, many rural areas of Arizona are experiencing substantial growth. Pima County grew by 26.5 percent between 1990 and 2000 (U.S. Census Bureau 2000). In the same time period, Santa Cruz County grew by 29.3 percent (U.S. Census Bureau 2000).

An undetermined level of border crossings by UDI occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase into the foreseeable future. Additionally, agricultural, recreation, OHV use, grazing, and other activities continue to occur on private and state land and adversely affect LLNB and their habitats.

2.4h Effects Determination and Incidental Take

The potential disturbance of LLNB in undetected roosts from construction noise and potential mortality of transplanted forage species may affect, and is likely to adversely affect, this species.

No take of LLNB is anticipated as a result of the proposed action. First, noise disturbance will likely impact small numbers of individuals and will be short term in duration. Secondly, changes in agave and saguaro cacti distribution will be not be significant in any single location.

2.5 CHIRICAHUA LEOPARD FROG (*Rana chiricahuensis*) (Threatened)

2.5a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. The action area for the CLF consists of all cienegas, pools, livestock tanks, and streams at elevations above 3,200 ft (975 m) in the Tumacacori and Atascosa/Pajarito mountains. The action area also includes the entire watersheds of these aquatic systems and lies almost entirely on CNF land. That portion of the action area not on CNF land is a considerable distance downstream of the proposed action.

2.5b Natural History and Distribution

CLF (Figure 16) are distinguished from other members of the leopard frog (*Rana pipiens*) complex by a combination of characters, including a distinctive pattern on the rear of the thigh consisting of small, raised, cream-colored spots or tubercles on a dark background, dorsolateral folds that were interrupted and deflected medially, stocky body proportions, relatively rough skin on the back and sides, and often green coloration on the head and back (Platz and Mecham 1979). The species also has a distinctive call consisting of a relatively long snore of one to two seconds in duration (Davidson 1996, Platz and Mecham 1979).

Figure 16. Chiricahua leopard frog.

CLF are riparian habitat generalists, occupying springs, cienegas, canals, small creeks, mainstem rivers, lakes and livestock tanks at elevations of 3,281 ft (1,000 m) to 8,890 ft (2,710 m) in central and southeastern Arizona; west-central and southwestern New Mexico; and in Mexico, northern Sonora, and the Sierra Madre Occidental of Chihuahua, northern Durango and northern Sinaloa (Platz and Mecham 1984, Degenhardt et al. 1996, Sredl et al. 1997). Adult CLF are the most aquatic of all Arizona leopard frogs, requiring aquatic habitats for larval forms and semi-aquatic habitats for adult forms. CLF may breed anytime, but breeding in late spring and early summer is most common. Eggs are oviposited in shallow water attached to vegetation, or on bottom substrate. Tadpoles can metamorphose in as few as three months, but may overwinter and metamorphose the following spring. Because time from hatching to metamorphosis is shorter in warm water than cold water, water permanency is probably more important at higher elevations.

Heterogeneous habitat is important for leopard frog populations; shallow water with emergent vegetation is important for breeding and deeper water provides escape cover for adults. In Arizona, slightly more than half of known historic localities are natural lotic systems, a little less than half are stock tanks, and the remainder are lakes and reservoirs (Sredl et al. 1997). Sixty-three percent of extant populations in Arizona occupy stock tanks (Sredl and Saylor 1998). Although stock tanks provide refugia for frog populations and are important for this species in many areas, such tanks support only small populations and these habitats are very dynamic. Tanks often dry out during drought, and flooding may destroy downstream impoundments or cause siltation, either of which may result in loss of aquatic communities and extirpation of frog populations. Periodic maintenance to remove silt from tanks also may cause a temporary loss of habitat and mortality of frogs.

CLF are rarely found in aquatic sites inhabited by non-native fish, bullfrogs (*Rana catesbiana*), and/or crayfish (*Oronectes virilis*). However, in complex systems or large aquatic sites, CLF may coexist with low densities of non-native predators (Bloomquist et al. 2002).

Where the species is extant, sometimes several small populations are found in close proximity, suggesting metapopulations are important for preventing regional extirpation (Sredl et al. 1997). Disruption of metapopulation dynamics is likely an important factor in regional loss of populations (Sredl et al. 1997, Sredl and Howland 1994). CLF populations are often small and their habitats are dynamic, resulting in a relatively low probability of long-term population persistence. However, if populations are relatively close together and numerous, extirpated sites can be recolonized.

The range of the species is divided into two parts, including: (1) a southern group of populations (the majority of the range) located in mountains and valleys south of the Gila River in southeastern Arizona, extreme southwestern New Mexico, and Mexico; and (2) northern montane populations in west central New Mexico and along the Mogollon Rim in central and eastern Arizona (Platz and Mecham 1979). Historical records exist for Pima, Santa Cruz, Cochise, Graham, Apache, Greenlee, Gila, Coconino, Navajo, and Yavapai counties in Arizona, and Catron, Grant, Hidalgo, Luna, Soccoro, and Sierra counties in New Mexico (Sredl et al. 1997, Degenhardt et al. 1996). The distribution of the CLF in Mexico is unclear. The species has been reported from northern Sonora, Chihuahua, and Durango (Hillis et al. 1983, Platz and Mecham 1979, 1984) and, more recently, from Aguascalientes. However, Webb and Baker (1984) concluded that frogs from southern Chihuahua were not CLF. The taxonomic status of *chiricahuensis*-like frogs in Mexico from southern Chihuahua to Aguascalientes is unclear and in this region another leopard frog, *Rana montezumae,* may be mistaken for the CLF.

Recent evidence suggests a chytridiomycete skin fungi is responsible for observed declines of frogs, toads, and salamanders in portions of Central America (Panama and Costa Rica), South America (Atlantic coast of Brazil, Ecuador, and Uruguay), Australia (eastern and western states), New Zealand (South Island), Europe (Spain and Germany), Africa (South Africa, “western Africa”, and Kenya), Mexico (Sonora), and the United States (8 states) (Speare and Berger 2000, Longcore et al. 1999, Berger et al. 1998). Ninety-four species of amphibians have been diagnosed as infected with the chytrid *Batrachochytrium dendrobatidis*. In Arizona, chytrid infections have been reported from four populations of CLF, as well as populations of Rio Grande leopard frog (*Rana berlandieri*), Plains leopard frog (*Rana blairi*), lowland leopard frog (*Rana yavapaiensis*), Tarahumara frog (*Rana tarahumarae*), canyon treefrog (*Hyla arenicolor*), and Sonora tiger salamander (*Ambystoma tigrinum stebbinsi*) (Davidson et al. 2000, Sredl and Caldwell 2000, Morell 1999). The disease was recently reported from a metapopulation of CLF from New Mexico; that metapopulation may have been extirpated.

The role of the fungi in the population dynamics of the CLF is undefined; however, it may well prove to be an important contributing factor in observed population decline. Rapid death of recently metamorphosed frogs in stock tank populations of CLF in New Mexico was attributed to post-metamorphic death syndrome (Declining Amphibian Populations Task Force 1993). Hale and May (1983) and Hale and Jarchow (1988) believed toxic airborne emissions from copper smelters killed Tarahumara frogs and CLF in Arizona and Sonora. However, in both cases, symptoms of moribund frogs matched those of chytridiomycosis. Chytrids were recently found in a specimen of Tarahumara frog collected during a die off in 1974 in Arizona. This earliest record for chytridiomycosis corresponds to the first observed mass die-offs of ranid frogs in Arizona (USFWS 2002c).

2.5c Critical Habitat
No critical habitat has been designated for this species.

2.5d Current Status Statewide
USFWS listed this species as threatened throughout its range in the southwestern United States and in Mexico on 13 June 2002 (USFWS 2002c). Potential threats to the species include disease, predation and possibly competition by non-native organisms, including fishes in the family Centrarchidae (*Micropterus* spp., *Lepomis* spp.), bullfrogs, tiger salamanders (*Ambystoma tigrinum stebbinsi*), crayfish, and several other species of fishes, including, in particular, catfishes (*Ictalurus* spp. and *Pylodictus oliveris*) and trout (*Oncorhynchus* spp. (=*Salmo*) and *Salvelinus* spp.) (USFWS 2002c). For instance, in the Chiricahua region of southeastern Arizona, Rosen et al. (1996a) found that almost all perennial waters investigated that lacked introduced predatory vertebrates supported CLF. All waters, except three that supported introduced vertebrate predators, lacked CLF.

Human factors affecting the species include modification or destruction of habitat through water dams, water diversions, groundwater pumping, introduction of non-native organisms, woodcutting, mining, contaminants, urban and agricultural development, road construction, overgrazing and altered fire regimes. Additional human factors include over-collection for commercial and scientific purposes.

In Arizona, the species is extant in seven of eight major drainages of historical occurrence (Salt, Verde, Gila, San Pedro, Santa Cruz, Yaqui/Bavispe, and Magdalena river drainages), but appears to be extirpated from the Little Colorado River drainage on the northern edge of the range. Within the extant drainages, the species was not found recently in some major tributaries and/or from river mainstems. For instance, the species was not reported from 1995 to the present from the following drainages or river mainstems where it historically occurred: White River, West Clear Creek, Tonto Creek, Verde River mainstem, San Francisco River, San Carlos River, upper San Pedro River mainstem, Santa Cruz River mainstem, Aravaipa Creek, Babocomari River mainstem, and Sonoita Creek.

USFWS reports that CLF were observed at 87 sites in Arizona from 1994 to 2001, including 21 northern sites and 66 southern sites (USFWS 2002c). Many of these sites have not been revisited in recent years; however, evidence suggests some populations have been extirpated in the Galiuro and Chiricahua mountains. In 2000, the species was also documented for the first time in the Baboquivari Mountains, Pima County, Arizona (USFWS 2002c).

Intensive and extensive surveys were conducted by AGFD in Arizona from 1990 to 1997 (Sredl et al. 1997). Included were 656 surveys for ranid frogs within the range of the CLF in southeastern Arizona. Rosen et al. (1994, 1996a, 1996b), Hale (1992), Wood (1991), Clarkson and Rorabaugh (1989), and others have also extensively surveyed wetlands in southeastern Arizona. It is unlikely that many additional populations will be found there. A greater potential exists for locating frogs at additional sites in the northern region of Arizona, as several new populations have been discovered on the Coconino National Forest in 2000 and 2001 (USFWS 2002c).

The latest information for Arizona (USFWS 2002c) indicates the species is extant in all major drainages in Arizona and New Mexico where it occurred historically. However, it has not been found recently in many rivers, valleys, and mountains ranges, including the following in Arizona: White River, East Clear Creek, West Clear Creek, Silver Creek, Tonto Creek, Verde River mainstem, San Francisco River, San Carlos River, upper San Pedro River mainstem, Santa Cruz River mainstem, Aravaipa Creek, Babocomari River mainstem, Sonoita Creek, Pinaleno Mountains, Peloncillo Mountains, Sulphur Springs Valley, and Huachuca Mountains. In many of these regions CLF were not found for a decade or more despite repeated surveys.

2.5e Environmental Baseline

The action area for this species lies within the Tumacacori EMA of the CNF. Within this EMA, CLF are present in Sycamore Canyon, Peña Blanca Spring, Hank & Yank Tank, and Bear Valley Tank (J. Rorabaugh, USFWS, pers. comm., 1 October 2002). Of these, Peña Blanca Spring and portions of Sycamore Canyon are downstream or near construction areas of the proposed action. Watershed condition is a function of percent groundcover present to dissipate rain and prevent excess erosion. Along the proposed ROW, watershed condition is satisfactory on the Sycamore Canyon watershed and the watershed immediately to the east, but unsatisfactory on the Peck Canyon watershed and the watershed on the northern boundary of the Tumacacori EMA. Peña Blanca Spring is not within a grazing allotment but is adjacent to Ruby Road. The spring is downstream of the Walker fire, a 16,369 acre (6,624 ha) human-caused fire along the international border. Portions of the Walker fire were very hot (especially near the international border and the upper slopes of ridges) while other areas (like Walker Canyon) burned relatively cool (T. Newman, CNF, pers. comm., 26 November 2002). While vegetation has begun to recover in some areas, other areas are highly susceptible to erosion due to lost groundcover (Figure 11).

The population in Sycamore Canyon is probably a source of immigrants to other suitable areas within the EMA (USFWS 2001b). Sycamore Canyon also is the only aquatic habitat within the EMA confirmed to contain the chytrid fungus (J. Rorabaugh, USFWS, pers. comm., 1 October 2002). While there are 17 historical records of CLF in the Atascosa and Pajarito mountains (USFWS 2001b), there are currently no plans for reintroducing CLF into any aquatic habitats in CNF (J. Rorabaugh, USFWS, pers. comm., 1 October 2002).

2.5f Effects of Proposed Action on the CLF

Direct Effects

Vehicle Collisions

No construction activities will occur within stock tanks, or other aquatic habitats; however, CLF may be present on land some distance away from these areas and construction traffic could result in vehicle collisions with individual CLF.

Indirect Effects

Habitat Modification

Some indirect impacts to CLF may result from modifications to its habitat caused by the construction of temporary access roads. The removal of vegetative cover for these roads will increase surface runoff and sediment transport and decrease infiltration of precipitation (Gifford and Hawkins 1978, Busby and Gifford 1981, Blackburn 1984, DeBano and Schmidt 1989, Belnap 1992, Belsky and Blumenthal 1997). The use of both existing and new roads by heavy equipment makes them less permeable because of compaction and crusting (Rostagno 1989). Compaction leads to reduced infiltration and an increase in the force of overland flow, which in turn leads to increased erosion. Increased erosion can accelerate sedimentation of deep pools used by CLF (Gunderson 1968). Sediment can alter primary productivity and fill interstitial spaces in streambed materials with fine particulates that impede water flow, reduce oxygen levels, and restrict waste removal (Chapman 1988). Because alignment of the structures is approximately 1 mi (1.6 km) from Sycamore Canyon, impacts from road erosion are expected to be insignificant in that area, and BMPs will minimize erosion into other aquatic systems closer to the proposed alignment. However, unusually large precipitation events may temporarily overwhelm BMPs and result in some increase in sediment transport.

Transport of Disease Agents

The construction of temporary roads will provide construction vehicles and personnel access to remote areas and potential CLF habitats not currently accessible by vehicles. Because these same construction vehicles and personnel will be used along the entire proposed ROW, there may be an increased possibility for the introduction of the chytrid fungus into aquatic habitats that do not presently contain the fungus. Chytrid fungus could be carried inadvertently in mud clinging to wheels, boots, or other equipment. The use of a diluted-bleach wash station when equipment and personnel move between wet zones will significantly reduce the potential for unintentional introduction of the disease to new aquatic habitats.

Increased Legal and Unauthorized Access to CLF Habitat
Recreationists may access CLF habitat, using roads constructed for the proposed action, even after the roads have been closed and revegetated. Unmanaged OHVs can damage riparian vegetation, increase siltation in pools, compact soils, disturb the water in stream channels, and crush CLF. Increased human access to these aquatic habitats also may lead to the introduction of non-native predators to streams and stock tanks or illegal killing or collection of CLF. Long-term monitoring and maintenance of road closures will minimize the probability of unauthorized access and thereby minimize any adverse effects associated with such access.

Accidental Wildfire
Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). Roads constructed for the proposed action may allow the establishment or increased density of non-native grasses, such as Lehmann's lovegrass, an invasive species that facilitates wildfires (McPherson 1995). Wildfires could remove groundcover that is important in dissipating rainfall energy and reducing erosion.

However, new roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977). If deemed appropriate, new roads may allow fuelwood collection in areas currently not accessible, thereby reducing the density of downed, woody material, which is capable of carrying wildfires across the landscape.

The measures outlined in the Fire Prevention Plan being developed will minimize the risks of wildfires associated with the proposed action.

Invasive Species
Roads may be the first point of entry for invasive species into a new landscape, and can serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.5g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. The action area for this species crosses private, state, and federal lands. Future federal actions on USFS lands will be subject to Section 7 consultation but these actions will not be considered cumulative. Because the action area for this species includes the entire watersheds of the aquatic habitats on the CNF, some of the future planned actions on private and state lands in Santa Cruz County may be considered cumulative.

Although the amount of future private development within Santa Cruz County is unknown, many rural areas of Arizona are experiencing substantial growth. Between 1990 and 2000, Santa Cruz County grew 29.3 percent (U.S. Census Bureau 2000). Despite being downstream of occupied and potential CLF habitat, an increase in regional population translates into an increased demand for recreational use of USFS lands.

An undetermined level of border crossings by UDI occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase.

2.5h Effects Determination and Incidental Take

Potential vehicle impacts to dispersing CLF and increased transport of sediments into aquatic habitats may affect, and will likely adversely affect, this species.

No take of CLF is anticipated for the following reasons: (1) no construction activities will occur within occupied streams, stock tanks, or other CLF habitat; (2) implementation of BMPs will minimize erosion.

2.6 PIMA PINEAPPLE CACTUS (*Coryphantha scheeri* var. *robustispina*) (Endangered)

2.6a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. Potential habitat for the PPC includes those areas of the proposed ROW from the TEP South Substation to an elevation of 4,600 ft (1,402 m) in the foothills of the Tumacacori Mountains.

2.6b Natural History and Distribution

The PPC (Figure 17) is small and round with finger-like projections. Adult cactus range in size from 1.8 in (4.6 cm) to 18 in (46 cm) in height. At the tip of each projection or tubercle is a rosette of 10–15 straw-colored spines with one central hooked spine. Plants can be single or multi-stemmed and produce bright yellow flowers after summer rains (Roller 1996).

Figure 17. Pima pineapple cactus.

Populations of PPC are known to occur south of Tucson, in Pima and Santa Cruz counties, Arizona and adjacent northern Sonora, Mexico. It is distributed at low densities within the Altar and Santa Cruz Valleys, as well as in low-lying areas connecting these valleys.

PPC populations are generally found in open patches within semidesert grassland and Sonoran desertscrub plant communities (Brown 1994). They are typically found on flat alluvial bajadas that are comprised of granitic material and are most abundant within the ecotone between the grassland and desertscrub biomes (Roller 1996). This plant is found at elevations between 2,362 ft (720 m) and 4,593 ft (1,400 m). PPC are not typically found in washes or riparian areas.

2.6c Critical Habitat

No critical habitat has been designated for this species.

2.6d Current Status Statewide

USFWS listed PPC as endangered throughout its range on 25 October 1993 (58 FR 49875). Habitat loss and degradation, habitat modification and fragmentation, limited geographic distribution, plant species rareness, illegal collection and difficulties in protecting areas large enough to maintain functioning populations are factors that contributed to the current endangered status of this species. PPC densities vary throughout its range with the highest densities occurring south of Tucson through the Santa Cruz Valley (to the town of Amado and surrounding developed parts of Green Valley and Sahuarita, and parts of the San Xavier District of the Tohono O’odham

Nation). Continued urbanization, farm and crop development, mine expansion, and invasion of non-native species are primary threats to PPC populations. Overgrazing by livestock, illegal plant collection, and fire-related interactions involving non-native Lehmann's lovegrass may also have negative impacts on PPC (USFWS 1993b).

2.6e Environmental Baseline

The environmental baseline for PPC evaluates the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and ecosystem within the action area. Due to the limited information on PPC population distributions under current habitat conditions, it is difficult to determine the current status of the plant statewide. USFWS has insufficient data to determine if the majority of populations of PPC can be sustained under current reduced and fragmented conditions.

Based on monitoring results, the range-wide status of PPC appears to have been recently affected by threats that completely alter or considerably modify more than a third of the surveyed habitat and have caused the elimination of nearly 60 percent of documented locations (USFWS 2001c). Dispersed, patchy clusters of individuals are becoming increasingly isolated as urban development, mining, and other commercial activities continue to detrimentally impact PPC habitat.

The proposed project area is primarily undeveloped, contains existing electrical distribution lines and associated roads (Figure 14) and is in close proximity to low-density housing developments and the Mission Mine Complex.

Surveys for PPC were conducted using an approved survey protocol (Roller 1996) that established a belt transect across identified potential habitat with each surveyor covering a 16 ft (5 m) to 23 ft (7 m) swath. One survey pass of the entire corridor was conducted, with intensive searches around detected PPC individuals. Surveys on state, private, and BLM land covered a 200-ft (61 m) wide area centered on the proposed structure alignment. On the CNF, the coverage was expanded to 750 ft (229 m) wide. During surveys conducted between July 2002 and March 2003, 52 PPC were detected within the 125-ft (38.1 m) ROW between the TEP South Substation and the CNF boundary (HEG 2003, unpublished data). All detected PPC locations were recorded using a Global Positioning System (GPS) unit.

2.6f Effects of Proposed Action on the PPC

<u>Direct Effects</u>

Because the precise locations of structures and access roads can be modified to avoid sensitive resources, the proposed action will not result in the loss of any individual PPC. All known individuals of PPC near construction areas and along main access routes will be clearly marked and protected to avoid impacts.

Indirect Effects

Modification of Habitat

The construction of new access roads and the installation of structures will alter PPC seed sources in unoccupied, but potential, PPC habitat. Construction vehicles will compact soil, changing water infiltration rates, and road construction will dramatically alter soil structure and seed source depth. Disturbance of structure installation sites and many access roads will be temporary and will regenerate as potential PPC habitat in the future. Some recent observations indicate that PPC may readily establish in recently disturbed habitats (USFWS 2002d), but these areas must be allowed to recover for many years, even decades.

To determine the extent of proposed disturbance to PPC habitat, recent aerial photography was used to eliminate areas not suitable for PPC, including slopes over 15 percent, washes, and previously disturbed areas such as roads, buildings, mining disturbance, etc. Based on this analysis, the ROW was divided into habitat classes based upon density of PPC in each area. The habitat classes are as follows: Class A = >0.3 PPC/acre; Class B = 0.1 – 0.3 PPC/acre; Class C = 0* - 0.09 PPC/acre.

The amount of permanent disturbance from access roads and pole locations was calculated for each habitat class and are presented below in Table 3. To mitigate for this potential loss of PPC habitat, TEP will purchase 36.45 credits in a USFWS-approved conservation bank for PPC.

Increased Legal and Unauthorized Access to PPC Habitat

Much of the proposed corridor through PPC habitat parallels existing electrical distribution lines with existing utility access roads; however, new access roads will be constructed, potentially resulting in unintended access into previously undisturbed PPC habitat, especially by OHV users. Off-road travel could directly impact additional PPC or impede seedling establishment through changes in soil characteristics.

Accidental Wildfire

Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). It is widely regarded that most succulent species are negatively impacted by fire and are not fire-adapted (Rogers and Steele 1980, McLaughlin and Bowers 1982). Plants die by direct heating of the fire, or later through indirect fire effects such as grazing of spineless plants, post-fire increase in plant tissue temperature, or the introduction of disease or infestation into weakened plants (Thomas 1991). The sparse distribution of this species across the landscape, however, can mean that loss of a few individuals to fire can greatly affect the range and density of local PPC populations.

However, new roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban

Table 3. Amount of PPC habitat disturbance and proposed mitigation for TEP's Sahuarita to Nogales Transmission Line - Western Corridor										
PPC Data					Habitat Quality Class	Disturbance				
PPC Area as shown on map	Potential PPC habitat (acres) within each area	Total # PPC found during survey	# PPC in 125' ROW	Density (# in ROW/acres of potential habitat)		Length of new roads in each area	Acres of disturbance from roads	# of structures in each area	Acres of disturbance from structures	Total Disturbance in each area
1	110.2	116	30	0.27	B	5.47mi	7.96	59	0.034	7.994
2	37.9	12	4	0.11	B	2.02 mi	2.94	17	0.01	2.95
3	59.1	3	0	0*	C	0.5 mi	0.73	30	0.017	0.747
4	48.1	0	0	0	D	0.42 mi	0.61	38	0.022	0.632
5	9.2	21	11	1.2	A	0.9 mi	1.31	5	0.002	1.312
6	68.8	11	6	0.09	C	5.26 mi	7.65	30	0.017	7.667
7	62.6	5	1	0.02	C	5.27 mi	7.67	38	0.022	7.692

Proposed Mitigation

PPC Density	Habitat Quality Class	Mitigation Ratio	Total acres of disturbance in category	Total mitigation bank credits
>0.31/acre	A	3:1	1.31	3.93
0.1 - 0.3/acre	B	1.5:1	10.94	16.41
0* - 0.09/acre	C	1:1	16.11	16.11
0/acre	D	0	0.632	N/A
			TOTAL	36.45

* = These areas have a 0/acre density, but PPC were found in the vicinity of the ROW.

1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977). The measures outlined in the Fire Prevention Plan being developed will minimize the risks of wildfires associated with the proposed action.

Invasive Species

Roads may be the first point of entry for invasive species into a new landscape, and can serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.6g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. Under Section 9 of the ESA, the taking of listed animals is specifically prohibited, regardless of land ownership status. For listed plants, these prohibitions and the protection they afford do not apply. Listed plant species are protected only from deliberate removal from federal lands. There is no protection against removal from, or destruction of, plants on private land under the ESA by a landowner.

Although the amount of future private development within the action area is unknown, many rural areas of Arizona are experiencing substantial growth. Pima County grew by 26.5 percent between 1990 and 2000 (U.S. Census Bureau 2000). Because of growth rates and the development pressures of nearby Tucson and Sahuarita, Arizona, it is foreseeable that some lands adjacent to the proposed ROW will be developed. These developments will likely include increases in associated infrastructure such as roads, groundwater use, and commercial services, all resulting in the degradation of PPC habitat.

An undetermined level of border crossings by UDI occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase. Additionally, agricultural, recreation, OHV use, grazing, and other activities continue to occur on private and state lands and adversely affect PPC and its habitat.

2.6h Effects Determination

The disturbance of potential PPC habitat may affect, and is likely to adversely affect the species through hindering seedling establishment. The adverse affects to the species will be mitigated through the purchase of mitigation bank credits.

2.7 **SONORA CHUB** (*Gila ditaenia*) (Threatened)

2.7a Action Area

The action area means all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. In streams, the action area is often much larger than the area of the proposed action because impacts in the watershed may be concentrated in the stream and actions within the stream may be carried downstream well outside of the immediate project area. The action area for the Sonora chub is the entire Sycamore Canyon watershed.

2.7b Natural History and Distribution

The Sonora chub (Figure 18) is a stream-dwelling member of the minnow family (Cyprinidae) and can achieve total lengths of 7.8 in (200 mm) (Hendrickson and Juarez-Romero 1990). In the United States, it typically does not exceed 5 in (125 mm) (Minckley 1973), although specimens up to 6 in (150 mm) have been measured. The Sonora chub has 63 to 75 scales in the lateral line, and the scales bear radii in all fields. The mouth is inferior and almost horizontal. There typically are eight rays in the dorsal, anal, and pelvic fins, although the dorsal fin can have nine (Miller 1945), and the anal and pelvic fins seven (Rinne 1976). The body is moderately chubby and dark-colored, with two prominent black bands above the lateral line and a dark, oval basicaudal spot. Breeding individuals are brilliantly colored (Miller 1945).

Figure 18. Sonora chub.

Sonora chub spawn at multiple times from spring through summer, most likely in response to flooding during the spring and summer rains (Henderickson and Juarez-Romero 1990). Although Sonora chub is regularly confined to pools during arid periods, it prefers riverine habitats. In lotic waters in Mexico, Henderickson and Juarez-Romero (1990) commonly found Sonora chub in pools less than 2 ft (0.61 m) deep, adjacent to or near areas with a fairly swift current, and over sand and gravel substrates. It was less common in reaches that were predominately pools with low velocities and organic sediments. Sonora chub are adept in exploiting small marginal habitats and can survive under severe environmental conditions. They can maneuver upstream past small waterfalls and other obstructions to colonize newly-formed habitats (Carpenter and Maughan 1993).

Based on collection dates of young-of-the-year (YOY), spawning occurs in early spring (Minckley 1973). Larval and juvenile Sonora chub were found in Sycamore Creek and in a tributary to Rio Altar in November, which indicated breeding was apparently not limited by season. Adults with breeding coloration were also taken during these periods (Hendrickson and Juarez-Romero 1990). In Sycamore Creek, adults with breeding colors were seen from April through September in 1990 and 1991. Larvae and juveniles 0.6 in (15mm) to 0.7 in (18 mm) were seen in April, May, and September (Carpenter 1992), suggesting that spawning occurred after the spring and summer rains. Bell (1984) also noted young after heavy flooding and suggested that post-flood spawning is a survival mechanis. During spawning, Sonora chub broadcast eggs onto fine gravel substrates in slowly flowing water for hatching and development. There are no nests built, and no parental care given. Larvae use shallow habitats at pool margins where they feed on microscopic organisms and algae. As adults they can exploit shallow to deep pools, runs, and riffles as available. In 2000, multiple spawning in California Gulch was documented (USFS 2000).

Sonora chub respond to wet and dry cycles by expanding into riffles, runs, and pools during wet periods, and then shrinking back to deep pools as the stream dries. A substantial number of Sonora chub die when they become trapped in habitats that do not sustain perennial water during arid periods (Carpenter and Maughan 1993). Recolonization is dependent on individuals that survived the dry period. The species has an amazing capacity for reproduction and recruitment as its habitat expands. It can explode from a small number of individuals occupying a few pools to a population numbering in the thousands and occupying newly-wetted habitats in just a few weeks or months. The capability of the population to increase by several orders of magnitude within a few months is most likely an adaptation to the harsh climate and intermittent nature of southwestern riparian systems, which has allowed the Sonora chub to survive until present (Bell 1984).

2.7c Critical Habitat

Critical habitat was designated at the time of federal listing to include Sycamore Creek, extending downstream from and including Hank and Yank Spring, to the United Staes-Mexico border. Also designated was the lower 1.2 mi (2 km) of Peñasco Creek, and the lower 0.25 mi (0.4 km) of an unnamed stream entering Sycamore Creek from the west, about 1.5 mi (2.4 km) downstream from Hank and Yank Spring. In addition to the aquatic environment, critical habitat includes a 39.3 ft (12 m) wide riparian area along each side of Sycamore and Peñasco creeks. This riparian zone is essential to maintain the creek ecosystem and stream channels and the conservation of the species (USFWS 1986). The proposed action does not pass through designated Sonora chub critical habitat but is located approximately 1 mi (1.6 km) upstream of critical habitat.

2.7d Current Status Statewide

The Sonora chub was listed in the United States as threatened on 30 April 1986 (51 FR 16042) with critical habitat. The species is also listed by Arizona as a “species of special concern” (AGFD 1996), as a threatened species by the Republic of Mexico (Secretaria de Desarrollo Social 1994), and included on the Regional Forester’s list of sensitive species (USFS 1999).

Sonora chub is locally abundant in Sycamore Canyon and has been found as far north in the canyon as Casita Spring (T. Newman, CNF, pers. comm. 13 May 2002), although the habitat is limited in extent (Minckley and Deacon 1968). In Mexico, it is found in the Magdalena and Altar rivers, where it is considered relatively secure (Henderickson and Juarez-Romero 1990). In 1995, Sonora chub were found in California Gulch (AGFD 1995a). The overall estimated current chub habitat is 10 mi (16.1 km) length of

Sycamore Creek and California Gulch, including a 39 ft (12 m) wide riparian area along each side of Sycamore and Peñasco creeks. A recovery plan was written in October 1992 (USFWS 1992).

Potential threats to Sonora chub are related to additional watershed developments, such as grazing, mining, road construction, and agricultural development, as well as predation by non-native vertebrates such as green sunfish (Minckley 1973) and bullfrogs (AGFD 1988). The green sunfish was the last non-native fish recorded in Sycamore Creek prior to 1989 (USFWS 1999b)

2.7e Environmental Baseline

The action area for this species lies within the Tumacacori EMA of the CNF. There is no authorized livestock grazing immediately adjacent to Sycamore Creek from the United Satates - Mexico border to the corrals north of Ruby Road. A livestock exclosure encompassing approximately 2,175 acres (880 ha) was completed around this area in 1998. Furthermore, roadways in Sycamore Canyon south of Ruby Road are closed to all vehicles, and Casita Spring, north of the corrals, is also fenced to exclude livestock. Both exclosures are periodically checked and maintained by CNF personnel. Violations of the road closure were recorded in 1999 and 2000 (CNF 2000).

The Sycamore Creek Watershed consists of 16,645 acres (6,737 ha) within the Tumacacori EMA and is in satisfactory condition. The Sycamore Canyon watershed lies within the Bear Valley allotment. This allotment is permitted for 350 cattle, but use of the area in 2002 was projected to be only 200 cattle. The range condition on the Bear Valley allotment is moderately high, but with an unknown trend.

CNF personnel have conducted 6 years of pool surveys in Sycamore Canyon to document trends that may indicate whether habitat for the Sonora chub is increasing, decreasing, or remaining static. These surveys record pool area index (surface area of pools per run) and presence/absence of Sonora chub within runs. In 2002 the pool index showed a 50 percent decrease from the previous five year average. The pool area index in 2001 was more than double the previous five year average.

Between 1997-2001, Sonora chub occupied most of the available pools. In 2002, the number of occupied pools was the lowest recorded during the six year period. This reduced occupancy may be because of smaller, shallower pools being available in 2002, and, thus, Sonora chub may have been killed by predation or some other factor, such as low oxygen levels, prior to the survey (T. Newman, CNF, pers. comm., 9 August 2002). Newman believes there are sufficient numbers of Sonora chub surviving in available pools to fill the available habitat once rains occur. Once pools are connected, Sonora chub move into the newly available habitat. The effect of movement can be most easily seen in the information on the Ruby Road upstream segment. Even though this is a short stream segment and only has a few pools, it has been occupied four of the six years covered by these surveys. Despite having no occupied pools for two years (1999 and 2000), when conditions improved in 2001, the majority of the pools were occupied.

2.7f Effects of Proposed Action on the Sonora Chub and Critical Habitat

Direct Effects

No direct effects to the Sonora chub are anticipated as a result of the proposed action because construction activities will not occur within occupied or potential Sonora chub habitat.

Indirect Effects

Modification of habitat

Indirect impacts to Sonora chub may result from modifications to habitat from the construction of access roads and installation of structures. The removal of vegetation for roads and structures will increase surface runoff and sediment transport, and decrease infiltration of precipitation (Gifford and Hawkins 1978, Busby and Gifford 1981, Blackburn 1984, DeBano and Schmidt 1989, Belnap 1992, Belsky and Blumenthal 1997). The use of roads by heavy equipment makes them less permeable because of compaction and crusting (Rostagno 1989). Compaction leads to reduced infiltration and an increase in the force of overland flow, which in turn leads to increased erosion.

Increased erosion could accelerate sedimentation of deep pools. As pools become shallower, water temperature rises. Warmer water temperatures may increase the impact of parasites or diseases within the chub population (USFWS 2001b). Sediment can alter primary productivity and fill interstitial spaces in streambed materials with fine particulates that impede water flow, reduce oxygen levels, and restrict waste removal (Chapman 1988). High-energy overland water flow increases erosion and downcutting of streams, and can create damaging debris flows. While BMPs will minimize impacts, some increase in erosion into Casita Spring may occur during unusually large precipitation events because of the spring's proximity to construction areas.

Increased Legal and Unauthorized Access to Sonora Chub Habitat

No new roads are proposed within the Sycamore Canyon exclosure; however, new roads are proposed near potential Sonora chub habitat upstream of Ruby Road, including a road proposed 656 ft (200 m) north of Casita Spring. Future unauthorized access to closed roads in this area could damage riparian vegetation, compact soils, and increase siltation in pools and stream channels. Increased human access to these aquatic habitats also may lead to the introduction of non-native predators to streams and stock tanks or illegal killing or collection of Sonora chub. The monitoring and maintenance of road closures will minimize the probability of unauthorized access and thereby minimize any adverse effects associated with such access.

Accidental Wildfire

Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). Roads constructed for the proposed action also may allow the establishment or increased density of non-native grasses, such as Lehmann's lovegrass, an invasive species that facilitates wildfires (McPherson 1995). Wildfires could remove groundcover that is important in dissipating rainfall energy and reducing erosion.

However, new roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977). If deemed appropriate, new roads may allow fuelwood collection in areas currently not accessible, thereby reducing the density of downed, woody material, which is capable of carrying wildfires across the landscape.

The measures outlined in the Fire Prevention Plan being developed will minimize the risks of wildfires associated with the proposed action.

Invasive Species

Roads may be the first point of entry for invasive species into a new landscape, and may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.7g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. Because the action area for this species is entirely on USFS land, all activities are subject to the consultation requirements established under Section 7 of the ESA, and, therefore, are not considered cumulative to the proposed action.

Although the amount of future private development within Santa Cruz County is unknown, many rural areas of Arizona are experiencing substantial growth. Between 1990 and 2000, Santa Cruz County grew by 29.3 percent (U.S. Census Bureau 2000). Despite being outside of occupied and potential chub habitat, an increase in regional population translates into an increased demand for recreational use of USFS land.

An undetermined level of border crossings by UDI also occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase.

2.7h Effects Determination and Incidental Take

<u>Effects to Species</u>

The transport of sediments into Casita Spring and upper Sycamore Canyon may affect the Sonora Chub, and is likely to adversely affect the species.

No take of Sonora chub is anticipated for the following reasons: (1) no construction activities will occur within occupied streams, and (2) BMP erosion control measures will minimize sediment transport.

Effects to Critical Habitat

The proposed action may affect, but is not likely to adversely modify Sonora chub critical habitat because BMPs will be in place to minimize erosion and because alignment of the structures is approximately 1 mi (1.6 km) from Sycamore Creek and Hank and Yank Spring.

2.8 **JAGUAR** (*Panthera onca*) (Endangered)

2.8a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. Because of the large movements possible by the jaguar and historical records for the species in a variety of habitats, the action area for the jaguar considered for the proposed action includes most of western Santa Cruz and southern Pima counties.

2.8b Natural History and Distribution

Jaguars (Figure 19) are the largest species of cat now native to the Western Hemisphere. Jaguars are large muscular cats with relatively short massive limbs, a deep-chested body, and cinnamon-buff in color with many black spots. Its range in North America includes Mexico and portions of the southwestern United States (Hall 1981). A number of jaguar records are known for Arizona, New Mexico, and Texas. Additional reports exist for California and Louisiana. Records of the jaguar in Arizona and New Mexico have been attributed to the subspecies *Panthera onca arizonensis*. The type specimen of this subspecies was collected in Navajo County, Arizona, in 1924 (Goldman 1932). Nelson and Goldman (1933) described the distribution of this subspecies as the mountainous parts of eastern Arizona north to the Grand Canyon, the southern half of western New Mexico, northeastern Sonora, and, formerly, southeastern California. The records for Texas have been attributed to another subspecies *P. o. veraecrucis*. Distribution of this subspecies was described by Nelson and Goldman (1933) as the Gulf slope of eastern and southeastern Mexico from the coast region of Tabasco, north through Vera Cruz and Tamaulipas, to central Texas. Swank and Teer (1989) indicated the historical range of the jaguar included portions of Arizona, New Mexico, and Texas. These authors consider the current range to be central Mexico through Central America and into South America as far as northern Argentina.

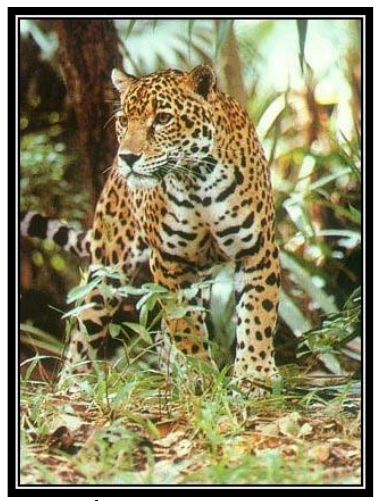
Figure 19. Jaguar.

Swank and Teer (1989) stated the United States no longer contains established breeding populations of jaguar, which probably disappeared from the United States in the 1960s. According to these authors, the jaguar prefers a warm tropical climate and is usually associated with water, and rarely found in extensive arid areas. Goldman (1932) believed the jaguar was a regular, but not abundant, resident in southeastern Arizona. Hoffmeister (1986) considered the jaguar an uncommon resident species in Arizona. He concluded that the reports of jaguars between 1885 and 1965 indicated a small but resident population once occurred in southeastern Arizona. Brown (1983a) suggested the jaguar in Arizona ranged widely throughout a variety of habitats from Sonoran desert scrub through subalpine conifer forest. Most of the records were from Madrean evergreen-woodland, shrub-invaded semidesert grassland, and along rivers.

Brown (1983a) presented an analysis suggesting there was a resident breeding population of jaguars in the southwestern United States at least into the 20th century. USFWS (1990) recognized that the jaguar continues to occur in the American southwest as an occasional wanderer from Mexico. Currently, breeding population of jaguar are unknown in the United States.

In Arizona, the gradual decline of the jaguar appeared to be concurrent with predator control associated with land settlement and the development of the cattle industry (Brown 1983a, USFWS 1990). Lange (1960) summarized the jaguar records from Arizona, and between 1885 and 1959 the reports consisted of 45 jaguars killed, six sighted, and two recorded by sign. Brown (1991) related that the accumulation of all known records indicated a minimum of 64 jaguars were killed in Arizona after 1900.

2.8c Critical Habitat

No critical habitat has been designated for this species.

2.8d Current Status Statewide

The jaguar was initially listed as endangered from the United States. - Mexico border southward to include Mexico and Central and South America (37 FR 6476, 1972; 50 CFR 17.11, August 1994). As a result of a petition, the jaguar was proposed as endangered in the United States (59 FR 35674; July 13, 1994). In a Federal Register notice dated 22 July 1997, the jaguar was listed as an endangered species in the United States (62 FR 39147).

The most recent records of jaguars in the United States are from Arizona. In 1971, a jaguar was taken east of Nogales and in 1986 one was taken from the Dos Cabezas Mountains. The latter reportedly had been in the area for about a year before it was killed. AGFD (1988) cited two recent reports of jaguars in Arizona. The individuals were considered to be transients from Mexico. One report (1987) was from an undisclosed location. The other report was from 1988, when tracks were observed for several days prior to the treeing of a jaguar by hounds in the Altar Valley, Pima County. An unconfirmed report of a jaguar at the Coronado National Memorial was made in 1991. In 1993, an unconfirmed sighting of a jaguar was reported for Buenos Aires National Wildlife Refuge. In March 1996, the presence of a jaguar was confirmed through photographs made in the Peloncillo Mountains of Arizona and New Mexico (Glenn 1996). AGFD reported a jaguar sighting in the Baboquívari Mountains in 1996, and in the fall of 1997, one was reported from the Cerro Colorado Mountains of southern Arizona. A jaguar was recently documented (December 2001) in the Atascosa Mountains within about 2 mi (3 km) of the proposed action.

2.8e Environmental Baseline

The Tumacacori EMA is the location of recent reports of jaguars in the United States. This area continues to include the most likely habitat that will support the existence of jaguars in the United States. Many of the larger canyon bottoms in the Tumacacori EMA contain substantial cover and could act as travel corridors for dispersing jaguars. It is believed that all recent sightings of jaguars in Arizona are males dispersing north from the northern most breeding population in Mexico in an effort to find unoccupied habitat (B. VanPelt, AGFD, pers. comm., 3 October 2002). Because no breeding pairs are thought to exist north of the United Sates-Mexico border, conservation of the Mexican population is vital to the future presence of jaguars in Arizona.

Under the leadership of AGFD and New Mexico Department of Game and Fish, a conservation agreement and strategy has been prepared to address the conservation of the jaguar in Arizona and New Mexico. This agreement established an interstate/intergovernmental Jaguar Conservation Team under a Memorandum of Agreement (MOA). This MOA has been signed by various state and federal cooperators and local and tribal governments with land and wildlife management responsibilities in the geographic area of concern. The Jaguar Conservation Agreement and Strategy serves as a mechanism for implementation of actions for the protection and conservation of the jaguar, while providing a template for the recovery of the species until a recovery plan is prepared and adopted.

The Conservation Agreement established procedures for reporting and evaluating jaguar sightings and compiling distribution and occurrence information, investigation of livestock depredation, evaluation of habitat suitability, development of education materials, and other activities. The Jaguar Conservation Agreement also provides for participation by interested private citizens and organizations. CNF grazing allotment permitees are participating in this process.

The December 2001 sighting mentioned earlier came from a remote camera operated under the direction of the Jaguar Conservation Team (S. Schwartz, AGFD, pers. comm., 17 September 2002). Currently, 14 remote cameras are positioned along the United States-Mexico border in an attempt to document movement of jaguars in and out of Arizona (J. Childs, Jaguar Conservation Team, pers. comm., 3 October 2002).

2.8f Effects of Proposed Action on the Jaguar

<u>Direct Effects</u>

Construction Noise and Activity

Because jaguars are primarily nocturnal, disturbance from construction activities, even in suitable dispersal habitat, is unlikely. The greatest likelihood of noise disturbance will result from the use of helicopters during early morning or late evening hours. However, because of the linear nature of the proposed action, any noise disturbance will be widely distributed and relatively short term in any location. Any jaguar within the action area will likely avoid construction sites. The use of additional remote cameras to monitor the United States-Mexico border south of the proposed action also will minimize the possibility of construction activities affecting breeding jaguars.

Indirect Effects

Habitat Modification and Fragmentation

Roads can reduce habitat value because of habitat fragmentation and edge effects. Some studies have shown that a few large areas of low road density, even in a landscape of high average road density, may be the best indicator of suitable habitat for large vertebrates (Rudis 1995). Because construction activities within riparian corridors or other major canyons will be minimal and widely distributed, no adverse impacts to the composition or structure of jaguar movement corridors or fragmentation of habitat is anticipated. Furthermore, access and construction roads for the proposed action commonly are spurs off existing roads and range between 500 ft (152 m) and 1,000 ft (305 m) in length, which do not isolate or separate habitat patches.

While access roads and structure site construction could degrade the habitats of jaguar prey species, effects on the prey base are difficult to quantify. The primary jaguar prey species in Arizona is deer (*Odocoileus* spp.), which have relatively large home ranges. Road-avoidance behavior (up to distances of 300 ft [90 m] to 600 ft [180 m]) is common in large mammals (Lyon 1983), including those species that may serve as prey for jaguars. Because of the linear nature of the proposed action, impacts to deer habitat will be widely distributed and relatively minor in any single area.

Increased Legal and Unauthorized Access to Jaguar Habitat

Jaguars appear to be relatively tolerant of some level of human activity (B. VanPelt, AGFD, pers. comm., 3 October 2002) and have been documented using areas that have recreational and agricultural activities occurring on a regular basis. However, increased human access to potential jaguar habitat through the use of temporary proposed construction roads could reduce the quality of the habitat. The road closure techniques outlined in the SECTION 1.4 and the RA (URS 2003) will minimize unintended uses of these roads.

Accidental Wildfire

Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). Because of their mobility, jaguars will not likely be directly impacted by wildfires; however, these wildfires could potentially alter or destroy portions of prey species habitat. While the short-term effects of wildfires may affect prey species through loss of forage from the fire, increased herbaceous production in the years following a fire may improve habitat in the long term.

New roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977). If deemed appropriate, new roads may allow fuelwood collection in areas currently not accessible, thereby reducing the density of downed, woody material, which is capable of carrying wildfires across the landscape. The fire prevention measures being developed for the Fire Prevention Plan will minimize the risks of wildfires associated with the proposed action.

Invasive Species

Roads may be the first point of entry for invasive species into a new landscape, and can serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.8g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. While the action area for this species encompasses private, state, and federal lands, the habitat with the highest potential for occupancy by jaguars occurs on USFS land in Santa Cruz County. Future federal actions on these lands will be subject to Section 7 consultation; these actions will not be considered cumulative.

Although the amount of future private development within Santa Cruz County is unknown, many rural areas of Arizona are experiencing substantial growth. Between 1990 and 2000, Santa Cruz County grew by 29.3 percent (U.S. Census Bureau 2000). Despite its distance from the proposed action, an increase in population in Nogales, Arizona and other regional population centers translates into an increased demand recreational use of USFS land.

An undetermined level of border crossings by UDI also occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase.

2.8h Effects Determination and Incidental Take

Construction noise and activity associated with the proposed action may affect the jaguar, but it is not likely to adversely affect the species because any disturbance will be widely distributed and short term in duration.

Because the proposed action is not likely to adversely affect the jaguar, no take is anticipated.

2.9 Gila Topminnow (*Poeciliopsis occidentalis occidentalis*) (Endangered)

2.9a Action Area

The action area includes all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. In streams, the action area is often much larger than the area of the proposed action because impacts in the watershed may be concentrated in the stream and actions within the stream may be carried downstream well outside of the immediate project area. The action area for the Gila topminnow is the entire Santa Cruz River watershed.

2.9b Natural History and Distribution

The Gila topminnow (Figure 20) was originally described by Baird and Girard (1853) as *Heterandria occidentalis* from a specimen collected in 1851 from the Santa Cruz River near Tucson. It was redescribed by Hubbs and Miller (1941) as *Poeciliopsis occidentalis*. As with all species in the family Poeciliidae, the Gila topminnow exhibits sexual dimorphism. Both males and females are tan to olive-bodied and usually white on the belly. Scales of the dorsum are darkly outlined and the fin rays contain melanophores, although lacking in dark spots. Dominant sexually mature males are often blackened, with some gold on the pre-dorsal midline, orange at the base of the gonopodium, and exhibits bright yellow pelvic, pectoral, and caudal fins (Minckley 1973). Females remain drab in coloration upon reaching maturity and throughout their life. All male poeciliids have a modified anal fin (gonopodium) used to fertilize the female internally.

Figure 20. Gila topminnow

Habitat requirements of *P. o. occidentalis* are broad. The species prefers shallow, warm, fairly quiet water; however, they can become acclimated to a much wider range of conditions. Both lentic habitats and lotic habitats with moderate current are easily tolerated. Temperatures from near freezing under ice to 98.6 degrees F (37 degrees C) have been reported, with a maximum tolerance of 109.4 degrees F (43 degrees C) for brief periods (Heath 1962). Gila topminnows can live in a wide range of water chemistries, with recorded pH values from 6.6 to 8.9, dissolved oxygen readings from 2.2 to 11 milligrams/liter (Meffe et al. 1983), and salinities from very dilute to sea water (Schoenherr 1974). The widespread historic distribution of Gila topminnows throughout rivers, streams, marshes, and springs of the Gila River Basin is evidence for their tolerance of these environmental extremes. One reestablished population (Mud Springs) survived for 16 years in a simple cement-watering trough before being moved.

Meffe et al. (1983) reported that topminnows can tolerate almost total loss of water by burrowing into the mud for 1-2 days. Preferred habitats contain dense mats of algae and debris, usually along stream margins or below riffles, with sandy substrates sometimes covered with organic mud and debris (Minckley 1973). Topminnows are usually found in the upper third of the water column and young show a preference for the warmest and shallowest areas (Forrest 1992). Simms and Simms (1992) found topminnows occupying pools, glides, and backwaters more frequently than marshes or areas of fast flow.

According to Schoenherr (1974), the spring-heads presently occupied by Gila topminnows are questionable as preferred habitat. Destruction of historically occupied habitats such as the marshes, sloughs, backwaters, and edgewaters of larger rivers and presence of non-native fish in such habitats that remain has undoubtedly forced Gila topminnow out of their preferred historic habitats and into the spring-heads and smaller erosive creeks we see them in today. Their tolerance of conditions in these habitats has allowed them to maintain populations with less impact from non-native fishes.

Gila topminnows are viviparous fish, meaning embryos grow and mature within the female and are born living. Eggs are fertilized internally through deposition of spermatophores (packets of sperm) into the female genital pore by the male gonopodium. Female Gila topminnow can store spermatozoa for several months, and may produce up to 10 broods after being isolated from males (Schultz 1961). Female Gila topminnows also exhibit superfetation in which 2 or more groups of embryos at different stages develop simultaneously. Females of the genus *Poeciliopsis* generally carry only 2 stages, although some *P. o. occidentalis* females have been shown to carry 3 stages for a few days when population densities are low. The mean interval between broods is 21.5 days (Schoenherr 1974). Brood size ranges from 1-31 dependent upon female standard length (SL) (Constantz 1974; Schoenherr 1974, 1977). Under optimum laboratory conditions, *Poeciliopsis* can produce 10 broods per year at intervals of 7 to 14 days (Schultz 1961). Sexual maturity can be attained as early as 2 months or as late as 11 months following birth, dependent upon the season of birth (Schultz 1961; Constantz 1976, 1979; Schoenherr 1974).

Breeding occurs primarily during January through August, but in thermally constant springs, young may be produced throughout the year (Heath 1962; Minckley 1973; Schoenherr 1974). During the peak of the breeding season up to 98 percent of mature females are pregnant (Minckley 1973). Dominant males turn black, defend territories, and court females. Smaller subordinate males do not turn black or defend territories. Instead, they take on a "sneaking" mating strategy where they attempt to mate with uncooperative females while the dominant male is busy elsewhere. Subordinate males have a longer gonopodium, which may have an adaptive benefit for this type of mating strategy (Constantz 1989). However, if the larger territorial males are removed, smaller males will become dominant, take on breeding coloration, and defend territories (Constantz 1975; Schoenherr 1977). Brood size and the onset of breeding in topminnows can be influenced by several factors including food abundance, photoperiod, temperature, predation upon the population, and female size. Increased food supply and larger female size are believed to contribute to the greater fecundity seen in topminnows from Monkey Spring canal compared with topminnows from Monkey Spring headspring (Constantz 1974, 1979; Schoenherr 1974, 1977). Sex ratios in stabilized populations nearly always favor females, varying from 1.5 to 6.3 per male (Schoenherr 1974).

Gila topminnows are opportunistic omnivorous feeders, having a gut length 1.5 to 2 times SL of the individual (Schoenherr 1974). They have weakly spatulate dentition characteristic of an omnivorous diet. Primary food items include detritus, vegetation, amphipods, ostracods, insect larvae, and rarely, other fish (Schoenherr 1974; Gerking and Plantz 1980; Meffe et al. 1983; Meffe 1984).

Gerking and Plantz (1980) noted that Gila topminnows prefer to eat large prey, but prey sizes are limited by mouth size. Schoenherr (1974) observed that individual fishes in complex habitats with several food resources present will select and focus on different items. He suggested that variation in feeding among individuals prevents over-utilization of a single resource, thus enhancing survival potential of the species.

In the United States, this species currently occurs in the Gila River drainage, Arizona, particularly in the upper Santa Cruz River, Sonoita and Cienega creeks, and the middle Gila River. The Gila topminnow is restricted to 14 natural localities in Arizona. In Mexico, the species occurs in the Río Sonora, Río de la Concepción, and Santa Cruz River but are not listed under the ESA. Gila topminnows occupy a variety of habitats, including: springs, cienegas, permanent and interrupted streams, and margins of large rivers. Habitat alteration and destruction, and introduction of predatory non-native fish, (principally western mosquitofish [*Gambusia affini*]) is the main reason for decline of the Gila topminnow.

2.9c Critical Habitat

No critical habitat has been designated for this species.

2.9d Current Status Statewide

The United States population of the Gila topminnow was federally listed as an endangered species in 1967 (USDOI 1967). The original recovery plan for Gila topminnow listed 10 extant natural populations: Monkey Spring, Cottonwood Spring, Sheehy Spring, Sharp Spring, Santa Cruz River near Lochiel, Redrock Canyon, Cienega Creek, Sonoita Creek (presumably including localities above and below Patagonia Lake), Salt Creek, and Bylas Springs (USFWS 1984). Gila topminnows were also known from Middle Spring (also known as SII or Second Spring) on the San Carlos Apache Indian Reservation (Meffe et al. 1983). Middle Spring was considered part of the Bylas Springs complex in the earlier recovery plan.

Since 1984, Gila topminnows have been discovered or rediscovered at 4 additional locations: North Fork of Ash Creek in 1985 (Jennings 1987), Fresno Canyon in 1992, Santa Cruz River north of Nogales in 1994, and Coal Mine Canyon in 1996 (Weedman and Young 1997). However, Gila topminnow were last collected from the North Fork of Ash Creek in 1985 and from Sheehy Spring in 1987. They have also been very rare or absent during recent surveys (last 5 years) of Sonoita Creek above Patagonia Lake and Santa Cruz River near Lochiel. Mosquitofish are quite common in both areas. Topminnows were extirpated from 1 of the original 10 localities, Salt Creek, by mosquitofish (Marsh and Minckley 1990), but the stream was renovated and restocked with Gila topminnows from Middle Spring. Subsequently, mosquitofish were found in the stream and it was again renovated and restocked with topminnows from Bylas Spring. Thus, there are 14 naturally occurring localities (considering Sonoita Creek above and below Patagonia Lake as 2 separate localities) currently known to support Gila topminnows in the United States.

Eleven of the naturally occurring locations currently supporting Gila topminnows are in the Santa Cruz River system: Redrock Canyon, Cottonwood Spring, Monkey Spring, upper Sonoita Creek, Fresno Canyon, Coal Mine Canyon, lower Sonoita Creek, Santa Cruz River north of Nogales, Cienega Creek, Sharp Spring, and the upper Santa Cruz River. The 2 remaining localities (Bylas Springs and Middle Spring) and Salt Creek are next to the Gila River on the San Carlos Apache Indian Reservation. Bylas Springs has been unsuccessfully poisoned twice to remove mosquitofish (Meffe et al. 1983; Brooks 1985; Marsh and Minckley 1990). Another attempt at renovation of Bylas Springs was done by USFWS Arizona Fishery Resource Office and has so far been successful. The population at Middle Spring was eliminated by lack of water during the summer of 1989, but was recently reestablished (following construction of additional pool habitat) with Gila topminnows from the original Middle Spring population held at Roper Lake State Park. Salt Creek has also been renovated and restocked with topminnows originally from Bylas Spring.

As part of past recovery actions, more than 200 Gila topminnow reintroductions or natural dispersals from reintroductions have occurred at 175 wild locations. For this count, a wild location refers to an area that does not have a mailing address, in contrast with a captive population that does (following Simons 1987). Eighteen wild populations remained in 1997, 17 of which are in historic range (Weedman and Young 1997). Seven of these populations are secure enough that they should persist into the foreseeable future. Minckley and Brooks (1985), Brooks (1985, 1986), Simons (1987), Bagley et al. (1991), Brown and Abarca (1992), and Weedman and Young (1997) describe the plight of re-established and captive populations of Gila topminnows.

Gila topminnows also have been stocked into many captive locations for propagation or conservation. Twelve captive populations were known to persist in 1997. The following publicly maintained populations are large enough to provide individuals for reintroductions, although one is known to be mixed with topminnows from more than one natural population (Arizona-Sonora Desert Museum, Boyce-Thompson Arboretum (mixed), Dexter National Fish Hatchery and Technology Center, Roper Lake State Park, Arizona State University, and Hassayampa River Preserve).

2.9e Environmental Baseline

Gila topminnow currently occupy the Santa Cruz River in its perennial reaches, as far north as Chavez Siding Road. This reach of the river was also occupied by longfin dace (*Agosia chrysogaster*), desert sucker (*Catostomus clarki*), Sonora sucker (*Catostomus insignis*), green sunfish (*Lepomis cyanellus*), and mosquitofish as recently as 1997 (USFWS 2001d). No Gila topminnows occur on the Tumacacori EMA and there are currently no plans for reintroductions in any locations (CNF 2000; D. Duncan, USFWS, pers. comm., 1 October 2002).

2.9f Effects of Proposed Action on the Gila topminnow

Direct Effects

The effects of the proposed action on this species are not anticipated to include direct effects to individual Gila topminnow because no construction will occur within occupied habitat.

Indirect Effects

Habitat Modification

Some indirect impacts to Gila topminnow habitat from erosion are possible from the construction of the proposed action. While the removal of vegetation for construction of access roads will increase surface runoff and sediment transport, and decrease infiltration of precipitation (Gifford and Hawkins 1978, Busby and Gifford 1981, Blackburn 1984, DeBano and Schmidt 1989, Belnap 1992, Belsky and Blumenthal 1997), the implementation of BMPs will help control erosion. However, unusually large precipitation events may temporarily overwhelm BMPs and result in some increase in sediment transport. Nevertheless, the distance of the proposed action from the Santa Cruz River will minimize the amount of sediments reaching Gila topminnow habitat.

Accidental Wildfire

Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). Roads constructed for the proposed action also may allow the establishment or increased density of non-native grasses, such as Lehmann's lovegrass, an invasive species that facilitates wildfires (McPherson 1995). Wildfires could remove groundcover that is important in dissipating rainfall energy and reducing erosion.

However, new roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977). If deemed appropriate, new roads may allow fuelwood collection in areas currently not accessible, thereby reducing the density of downed, woody material, which is capable of carrying wildfires across the landscape.

The measures outlined in the Fire Prevention Plan being developed will minimize the risks of wildfires associated with the proposed action. Measures outlined in the Invasive Species Management Plan also will minimize the introduction or spread of invasive species that may facilitate fires.

2.9g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. While the action area for this species encompasses private, state, and federal land, the habitat with the highest potential for occupancy by Gila topminnow occurs on private land in Santa Cruz County. Most future actions on private land will not be subject to Section 7 consultation.

Although the amount of future private development within Santa Cruz County is unknown, many rural areas of Arizona are experiencing substantial growth. Between 1990 and 2000, Santa Cruz County grew by 29.3 percent (U.S. Census Bureau 2000). Despite its distance from the proposed action, an increase in population in Nogales, Arizona and other regional population centers translates into an increased demand for recreational use of USFS lands.

An undetermined level of border crossings by UDI also occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase.

2.9h Effects Determination and Incidental Take

The transport of sediments into the Santa Cruz River may affect the Gila topminnow; however, any increase in sediments will be relatively small because of the distance of the proposed action from occupied habitat. Therefore, it is not likely to adversely affect the species.

Because the proposed action is not likely to adversely affect the species, no take of Gila topminnow is anticipated.